AVIFAUNAL WALK-THROUGH REPORT

PROPOSED KOUP 2 WIND ENERGY FACILITY AND ASSOCIATED INFRASTRUCTURE NEAR BEAUFORT WEST IN THE WESTERN CAPE PROVINCE



February 2023

AFRIMAGE Photography (Pty) Ltd Va: Chris van Rooyen Consulting VAT#: 4580238113

email: vanrooyen.chris@gmail.com Tel: +27 (0)82 4549570 cell

EXECUTIVE SUMMARY

Genesis Koup 2 Wind Farm (Pty) Ltd received an Environmental Authorisation (EA) (DFFE Ref: 12/14/16/3/3/1/2121) dated (22/09/2022), for the development of up to 211MW Koup 2 Wind Energy Facility (WEF) and associated infrastructure near Beaufort West which falls within the Beaufort West Local Municipality which falls within the jurisdiction in the Western Cape Province.

Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus'), a South African based environmental consultancy, as part of the Environmental Resources Management ('ERM') Group of Companies has been commissioned to undertake the Final Layout plan and EMPr associated with the authorised WEF and it's authorised grid infrastructure. As per the conditions of the relevant EAs various specialist pre-construction walkthroughs have been undertaken to inform the placement of infrastructure for the Final Layout.

This report presents the results and recommendations of the avifaunal walk-through exercise.

METHODOLOGY

Site inspections were conducted on 03 February 2023 with a vehicle and a drone to record all avifaunal sensitivities on, and in the immediate vicinity of the project site, which could influence the lay-out of the turbines. Emphasis was placed on locating nests of priority species, particularly species of conservation concern (SCC), which may be impacted by the proposed WEF. The data gathered during the 12-months monitoring from October 2019 to July 2020 was also taken into account. Priority species were defined as species included on the list of priority species of the Avian Wind Farm Sensitivity Map of South Africa compiled by Birdlife South Africa (Retief *et al.* 2012).

RESULTS

Appendix 3 lists the species Van Rooyen *et al.* (2021) recorded the period of pre-construction monitoring from October 2019 to 2020. The 29 species that were recorded on and around the project site during the site surveys in February 2023 are listed in Table 1.

RECOMMENDATIONS

The recommendations below are put forward for inclusion in the Final Environmental Management Programme (EMPr). These recommendations are based on the pre-construction monitoring conducted from October 2019 to July 2020 and the walk-through exercise in February 2023 (Van Rooyen *et al.* 2021):

Design phase

- It is recommended that a 150m turbine exclusion zone is implemented around all drainage lines at the project site, and a 200m turbine exclusion zone around dams and water troughs as a pre-cautionary measure against SCC and other priority species collisions (Figure 4). The current 32 turbine lay-out has taken this into account.
- It is recommended that all internal medium voltage cables are buried if technically possible.

- Those sections where the 33kV medium voltage cable cannot be trenched due to technical or environmental reasons, but needs run on overhead poles, the proposed pole designs must be approved by the avifaunal specialist, to ensure that the designs are raptor-friendly.
- It is recommended that bird flight diverters are fitted to all internal 33kV overhead lines according to the applicable Eskom engineering standard at the time.
- Consideration should be given to painting one third of one blade on each turbine signal red as a mitigation measure against avifaunal collisions, if feasible. While this mitigation measure is still considered experimental, data from Norway indicates a high level of effectiveness, even up to 100% for large raptors. If this can be done during the manufacturing phase, it can be done inexpensively.

Construction phase

- Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible, and in particular to the proposed road network. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of SCC.
- Removal of vegetation must be restricted to a minimum.
- 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.

Operational phase

- Vehicle and pedestrian access to the site should be controlled and restricted to access roads to prevent unnecessary disturbance of SCC.
- Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition (2015) of the best practice guidelines (Jenkins *et al.* 2011). The exact time when post-construction monitoring should commence, will depend on the construction schedule, and will be agreed upon with the site operator once these timelines and a commercial operational date have been finalised.
- As a minimum, post-construction monitoring should be undertaken for the first two years of operation, and then repeated again in Year 5, and again every five years thereafter for the operational lifetime of the facility. The exact scope and nature of the post-construction monitoring will be determined on an ongoing basis by the results of the monitoring through a process of adaptive management.
- Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels of SCC turn out to be biologically significant, including Shutdown on Demand (SDoD).

1.1 Operational phase

- 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.

2 IMPACT STATEMENT

It is recommended that the lay-out is approved, subject to the implementation of the mitigation measures as detailed in the updated Environmental Management Programme (EMPr).

DETAILS OF THE SPECIALIST AND EXPERTISE TO COMPILE A WALK-THROUGH REPORT

Chris van Rooyen (Avifaunal Specialist)

Chris has decades of experience in the management of wildlife interactions with electricity infrastructure. He was head of the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of co-operative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has worked in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. Chris also has extensive project management experience and has received several management awards from Eskom for his work in the Eskom-EWT Strategic Partnership. He is the author of 15 academic papers (some with co-authors), co-author of two book chapters and several research reports. He has been involved as ornithological consultant in numerous power line and wind generation projects. Chris is also co-author of the Best Practice for Avian Monitoring and Impact Mitigation at Wind Development Sites in Southern Africa, which is the industry standard. Chris also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

Albert Froneman (Avifaunal Specialist)

Albert has a Master of Science degree in Conservation Biology from the University of Cape Town and started his career in the natural sciences as a Geographic Information Systems (GIS) specialist at Council for Scientific and Industrial Research (CSIR). In 1998, he joined the Endangered Wildlife Trust where he headed up the Airports Company South Africa – EWT Strategic Partnership, a position he held until he resigned in 2008 to work as a private ornithological consultant. Albert's specialist field is the management of wildlife, especially bird related hazards at airports. His expertise is recognized internationally; in 2005 he was elected as Vice Chairman of the International Bird Strike Committee. Since 2010, Albert has worked closely with Chris van Rooyen in developing a protocol for pre-construction monitoring at wind energy facilities, and he is currently jointly coordinating pre-construction monitoring programmes at several wind farm facilities. Albert also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

DECLARATION BY THE SPECIALIST

I, Chris van Rooyen, declare that -

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

Ami in Laufe

Signature of the Specialist

Afrimage Photography t/a Chris van Rooyen Consulting

Name of Company:

22 May 2023

Date

DECLARATION BY THE SPECIALIST

I, Albert Froneman, declare that -

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

omon

Signature of the Specialist

Afrimage Photography (Pty) Ltd ta Chris van Rooyen Consulting

Name of Company:

22 May 2023

Date

1 BACKGROUND

Genesis Koup 2 Wind Farm (Pty) Ltd received an Environmental Authorisation (EA) (DFFE Ref: 12/14/16/3/3/1/2121) dated (22/09/2022), for the development of up to 211MW Koup 2 Wind Energy Facility (WEF) and associated infrastructure near Beaufort West which falls within the Beaufort West Local Municipality which falls within the jurisdiction in the Western Cape Province.

The project will include (as authorised):

- Up to 32 wind turbines, with a maximum export capacity of approximately 211MW;
- Each wind turbine will have a hub height and rotor diameter of up to approximately of up to 200m and rotor diameter of up to 200m.
- Permanent compacted hardstanding areas / platforms (also known as crane pads) of approximately 90m x 50m (total footprint of approx. 4 500m²) per turbine during construction and for no-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 with dimensions of approximately 30m x 30m x 5m in diameter;
- 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 1.5ha;
- 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 Batter 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;
- The wind turbines will be connected to the proposed substation via medium voltage (33kV) cables. Cables will be buried along access roads wherever technically another by means of medium voltage cable.
- Internal roads with a width of between 8m and 10m will provide access to each wind turbine. Existing site
 roads will e used wherever possible, although new site roads will be constructed where necessary. Turns
 will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind
 turbine positions;
- Site will be accessed via an existing gravel road from the N12 National Route (~10km of existing road, 31.81km of new roads to be constructed);
- One permanent Operational 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 mast (approximately 120m in height);

The properties associated with the Koup 2 Wind Energy Facility include:

- Portion 1 of the Farm Kaatjies Klaar No. 380; and
- Portion 18 of the Farm Kaatjies Kraal No. 380.

The Genesis Koup 2 Wind Farm (Pty) Ltd will also have its own on-site substation located on the adjacent Koup 1 WEF site.

The Genesis Koup 2 Wind Farm (Pty) Ltd also received EA's for a new proposed onsite Switching Station/ Collector Substation and associated 132kV power line was issued on 27 October 2022 to support the Koup 2 WEF in the Western Cape Province of South Africa, EA Reference 14/12/16/3/3/1/2537. Both will be included in the layout for the Koup 2 WEF for completeness and demonstrate its connection to the National Grid. The authorised Koup 1 WEF and Koup 2 WEF are located adjacent to each other and will operate as a cluster.

The infrastructure associated with the Switching Station portion of the on-site substation and 132kV Powerline (DFFE Ref: 14/12/16/3/3/1/253) includes:

- Switching Station portion of the on-site substation:
- One new 33/132kV on-site substation and/or collector substation, occupying an area of up to approximately 1.5ha. the proposed substation will be a step-up substation and will include an Eskom portion and IPP portion; and
- One new 132 kV overhead power line connecting the on-site substation to an off-site collector substation, or via a direct tie-in to the existing 400kV overhead power line, thereby feeding into the grid. The power line tower being considered for this development include self-supporting suspensions monopole structures for relatively straight sections of the line and angle strain towers where the route alignment bends to a significant degree. Maximum tower height is expected to be approximately 25m.

The Koup 2 Wind Energy Facility will also consider the Environmental Authorisation for Electrical Grid Infrastructure that supports the Koup 1 WEF and Koup 2 WEF, Western Cape Provinces (Ref; 14/12/16/3/3/1/2537) authorised within a 500m grid corridor.

The properties associated with the Electrical Grid Infrastructure to support the Koup 2 WEF includes:

- Portion 1 of the Farm Kaatjies Klaar No. 380;
- Portion 2 of the Farm Kaatjies Klaar No. 380;
- Portion 5 of the Farm Kaatjies Klaar No. 380;
- Portion 10 of the Farm Kaatjies Kraal No. 380;
- Portion 11 of the Farm Kaatjies Klaar No. 380;
- Portion 11 of the Farm Brits Eigendom No. 374;
- Portion 15 of the Farm Brits Eigendom No. 374;
- Portion 24 of the Farm Brits Eigendom No. 374;
- Portion 1 of the Farm Antjesfontein No. 380;
- Portion 1 of the Farm Riet Poort No. 13; and
- The Farm Riet Poort No. 231.

Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus'), a South African based environmental consultancy, as part of the Environmental Resources Management ('ERM') Group of Companies has been commissioned to undertake the Final Layout plan and EMPr associated with the authorised WEF and it's authorised grid infrastructure. As per the conditions of the relevant EAs various specialist pre-construction walkthroughs have been undertaken to inform the placement of infrastructure for the Final Layout.

2 METHODOLOGY

Site inspections were conducted on 03 February 2023 with a vehicle and a drone to record all avifaunal sensitivities on, and in the immediate vicinity of the project site, which could influence the lay-out of the turbines. Emphasis was placed on locating nests of priority species, particularly species of conservation concern (SCC), which may be impacted by the proposed WEF. The data gathered during the 12-months monitoring from October 2019 to July 2020 was also taken into account. Priority species were defined as species included on the list of priority species of the Avian Wind Farm Sensitivity Map of South Africa compiled by Birdlife South Africa (Retief *et al.* 2012). See Figure 1 for the 32 turbine lay-out.



Figure 1: The proposed lay-out of 32 turbines

3 RECEIVING ENVIRONMENT

3.1 DFFE National Screening Tool

The study area and immediate environment is classified as **Medium and High** sensitivity for avifauna, according to the DFFE online screening tool. The development sites contain confirmed habitat for species of conservation concern (SCC), as defined in the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020)¹, namely listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered, Vulnerable, Near-threatened or Data Deficient. The occurrence of SCC was confirmed during the surveys i.e. Ludwig's Bustard (Globally and Regionally Endangered) was recorded in the study area. This classification is assessed to be accurate as far as the impact of the proposed WEF and associated infrastructure is concerned, based on actual conditions recorded on the ground during the site visits in February 2023, and the 12-months of pre-construction monitoring which was conducted from October 2019 to July 2020 (Van Rooyen *et al.* 2021).

See Appendix 1 for the DFFE screening report.

3.2 Bird habitat

3.2.1 The natural environment

The turbine and control sites are located in Gamka Karoo, which is one of most arid vegetation units of the Nama Karoo biome. It consists of undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs, with sparse low trees. Dense stands of drought-resistant grasses cover broad sandy bottomlands, especially after abundant rains (Mucina & Rutherford 2006). The turbine site contains a few ephemeral drainage lines which are characterised by sandy channels with *Vachellia* karoo shrubs and small trees growing on the edges. This region is in the rain shadow of the Cape Fold Belt mountains in the south, with mean annual precipitation ranging from 100 – 240mm, mostly between December and April. Mean maximum and minimum monthly temperatures in Beaufort West are 38.7°C and -3.2°C for January (summer) and July (winter) respectively (Mucina & Rutherford 2006). Strong north-westerly winds occur in winter (Mucina & Rutherford 2006). The only longer-term surface water at the turbine site consists of a couple of dams and boreholes with reservoirs. Drainage lines flow only briefly after good rains, when pools of standing water may last for several weeks. The land is used for sheep and game farming.

3.2.2 The modified environment

Whilst the distribution and abundance of the bird species in the broader area are mostly associated with natural vegetation, as this comprises virtually all the habitat, it is also necessary to examine the few external modifications to the environment that have relevance for birds.

The following avifaunal-relevant anthropogenic habitat modifications were recorded within the broader area:

¹ The wind theme is only applicable to developments that are located in Renewable Energy Development Zones.

- Water points: The land use in the broader area is mostly small stock and game farming. The entire area is divided into grazing camps, with associated boreholes and drinking troughs. In this arid environment, open water is a big draw card for birds which use the open water troughs to bath and drink.
- **Dams:** The development site contains a few ground dams located in drainage lines. When these dams fill up after good rains, they contain standing surface water for several months, which attracts birds to bath and drink.
- Transmission lines: the Droërivier Proteus 1 400kV transmission line runs approximately 10km east of the project site. The transmission towers are used by raptors for perching and roosting, and also for breeding. A Martial Eagle nest is present tower 108, 11.3km from the closest proposed turbine location. In May 2020, both adult birds were observed perching on the towers around the nest, indicating that the territory is active. In August 2021, an adult bird as observed at the nest. In February 2023, the nest was inspected with a drone and found to be structurally in good shape, indicating an active territory. No birds were recorded at the time, but it is outside the breeding season.

Appendix 4 provides a photographic record of the habitat at the application site.

4 RESULTS AND CONCLUSIONS

4.1 Avifauna

Appendix 3 lists the species Van Rooyen *et al.* (2021) recorded the period of pre-construction monitoring from October 2019 to 2020. The 29 species that were recorded on and around the project site during the site surveys at the Koup1 and 2 WEF sites in February 2023 are listed in Table 1.

Species name	Scientific Name
Black-winged Kite	Elanus caeruleus
Booted Eagle	Aquila pennatus
Pale Chanting Goshawk	Melierax canorus
Greater Kestrel	Falco rupicoloides
Lesser Kestrel	Falco naumanni
Speckled Pigeon	Columba guinea
Cape Turtle-Dove	Streptopelia capicola
Laughing Dove	Streptopelia senegalensis
Namaqua Dove	Oena capensis
Common Swift	Apus apus
White-backed Mousebird	Colius colius
Acacia Pied Barbet	Tricholaema leucomelas
Spike-heeled Lark	Chersomanes albofasciata
Grey-backed Sparrowlark	Eremopterix verticalis
Barn Swallow	Hirundo rustica
Pied Crow	Corvus albus
Southern Grey Tit	Parus afer
Familiar Chat	Cercomela familiaris
Karoo Chat	Cercomela schlegelii

Table 1: Avifauna recorded during surveys at the project site on 03 February 2023. Priority species are shaded.

Karoo Scrub-Robin	Cercotrichas coryphoeus
Karoo Prinia	Prinia maculosa
Rufous-eared Warbler	Malcorus pectoralis
Dusky Sunbird	Cinnyris fuscus
Cape Sparrow	Passer melanurus
Black-headed Canary	Serinus alario
Yellow Canary	Crithagra flaviventris
White-throated Canary	Crithagra albogularis
Lark-like Bunting	Emberiza impetuani
Karoo Long-billed Lark	Certhilauda subcoronata

4.2 Nests

The following nests were recorded during the site surveys on 03 February 2023. All the nests were recorded on the Droërivier-Proteus 400kV HV line:

- 1. Martial Eagle nest Tower 108 (Figure 2)
- 2. Black-winged Kite Tower 114 (Figure 3)

The Martial Eagle nest is 11.3km from the closest turbine and will therefore not impact on the lay-out, as the recommended turbine exclusion zone around a Martial Eagle nest is 5km (see Figure 4). The Black-winged Kite nest is 10.6km away from the closest turbine, therefore the construction activities should not impact on the birds through disturbance (Figure 4).



Figure 2: A Martial Eagle nest recorded during the walk-through exercise on 03 February 2023 on Tower 108 of the Droërivier-Proteus 400kV.



Figure 3: A Black-winged Kite nest recorded during the walk-through exercise on 03 February 2023 on Tower 114 of the Droërivier-Proteus 400kV.

4.3 Other sensitivities

Surface water (drainage lines and water troughs) is crucially important for priority avifauna including all SCC. It is important to leave open space with no obstructions for birds to access and leave the surface water area unhindered (see Figure 4).

5 **RECOMMENDATIONS**

The recommendations below are put forward for inclusion in the Final Environmental Management Programme (EMPr). These recommendations are based on the pre-construction monitoring conducted from October 2019 to July 2020 and the walk-through exercise in February 2023 (Van Rooyen *et al.* 2021):

5.1 Design phase

- It is recommended that a 150m turbine exclusion zone is implemented around all drainage lines at the project site, and a 200m turbine exclusion zone around dams and water troughs as a pre-cautionary measure against SCC and other priority species collisions (Figure 4). The current 32 turbine lay-out has taken this into account.
- It is recommended that all internal medium voltage cables are buried if technically possible.

- Those sections where the 33kV medium voltage cable cannot be trenched due to technical or environmental reasons, but needs run on overhead poles, the proposed pole designs must be approved by the avifaunal specialist, to ensure that the designs are raptor-friendly.
- It is recommended that bird flight diverters are fitted to all internal 33kV overhead lines according to the applicable Eskom engineering standard at the time.
- Consideration should be given to painting one third of one blade on each turbine signal red as a mitigation measure against avifaunal collisions, if feasible. While this mitigation measure is still considered experimental, data from Norway indicates a high level of effectiveness, even up to 100% for large raptors. If this can be done during the manufacturing phase, it can be done inexpensively.

5.2 Construction phase

- Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible, and in particular to the proposed road network. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of SCC.
- Removal of vegetation must be restricted to a minimum.
- 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.

5.3 Operational phase

- Vehicle and pedestrian access to the site should be controlled and restricted to access roads to prevent unnecessary disturbance of SCC.
- Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition (2015) of the best practice guidelines (Jenkins *et al.* 2011). The exact time when post-construction monitoring should commence, will depend on the construction schedule, and will be agreed upon with the site operator once these timelines and a commercial operational date have been finalised.
- As a minimum, post-construction monitoring should be undertaken for the first two years of operation, and then repeated again in Year 5, and again every five years thereafter for the operational lifetime of the facility. The exact scope and nature of the post-construction monitoring will be determined on an ongoing basis by the results of the monitoring through a process of adaptive management.
- Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels of SCC turn out to be biologically significant, including Shutdown on Demand (SDoD).

5.4 Operational phase

- 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.

6 IMPACT STATEMENT

It is recommended that the lay-out is approved, subject to the implementation of the mitigation measures as detailed in the updated Environmental Management Programme (EMPr).

7 POST CONSTRUCTION MANAGEMENT PLAN

Please see Appendix 5.

8 **REFERENCES**

• Van Rooyen, C. & Froneman, A. 2021. Proposed construction of the Koup 2 wind energy facility and associated grid infrastructure, near Beaufort West, Western Cape Province, South Africa. Avifaunal Specialist Assessment Report. Unpublished report to SiVEST, July 2021.



Figure 4: The 32 turbine layout with implemented buffer zones around surface water and SCC nests.



MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at <u>eiadatarequests@sanbi.org.za</u> listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity	
	X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Neotis ludwigii
High	Aves-Polemaetus bellicosus
Medium	Aves-Neotis ludwigii
Medium	Aves-Afrotis afra
Medium	Reptilia-Chersobius boulengeri

Figure 1: The results of the screening tool for the Koup 1 WEF. The high sensitivity is linked to the potential occurrence of Ludwig's Bustard *Neotis Iudwigii* (Regional status: Endangered) and Martial Eagle *Polemaetus bellicosus* (Regional status: Endangered). The medium sensitivity is linked to Ludwig's Bustard, Southern Black Korhaan Afrotis afra (Regional status: Vulnerable) and Verreaux's Eagle *Aquila verreauxii* (Regional status : Vulnerable).

APPENDIX 2: BIRD HABITAT



Figure 1: Nama Karoo



Figure 2: Borehole with water trough



Figure 3: Drainage line with Vachellia woodland



Figure 4: The Droërivier-Proteus 400kV HV line

APPENDIX 3: SPECIES LIST PRE-CONSTRUCTION MONITORING AT THE KOUP 1 AND 2 WEFS 2019 – 2020

Driority Species		Fransects turbine	ransects control	Focal point	ΛÞ	VP control	Incidental
Karaa Karbaan	Eupodotio vigoraji	*	*		*	*	*
	Eupodolis vigorsii						*
Ludwig's Bustard							*
Marual Eagle		*	*		*	*	*
	Mellerax canorus						
4		2	2		2	2	4
Non-Priority Species		Transects turbine	Transects control	Focal point			
Acacia Pied Barbet	Tricholaema leucomelas	*	*				
African Red-eved Bulbul	Pvcnonotus nigricans	*	*				
African Spoonbill	Platalea alba			*			
Barn Swallow	Hirundo rustica	*					
Bar-throated Apalis	Apalis thoracica	*					
Black-eared Sparrow-lark	Eremopterix australis		*				
Black-headed Canary	Serinus alario		*				
Black-headed Heron	Ardea melanocephala		*				
Blacksmith Lapwing	Vanellus armatus			*			
Black-winged Stilt	Himantopus himantopus			*			
Bokmakierie	Telophorus zeylonus	*	*				
Cape Bunting	Emberiza capensis	*	*				
Cape Crow	Corvus capensis	*	*				
Cape Penduline Tit	Anthoscopus minutus		*				
cape Robin-chat	Cossypha caffra	*					
Cape Shoveler	Spatula smithii			*			
Cape Sparrow	Passer melanurus	*	*				
Cape Teal	Anas capensis			*			
Cape Turtle Dove	Streptopelia capicola	*	*				
Cape wagtail	Motacilla capensis		*				
Cape White-eye	Zosterops virens	*					
Cardinal Woodpecker	Dendropicos fuscescens	*					
Chat Flycatcher	Melaenornis infuscatus	*	*				
Chestnut-vented Tit-Babbler	Sylvia subcoerulea	*	*				
Dusky Sunbird	Cinnyris fuscus	*	*				
Egyptian Goose	Alopochen aegyptiaca	*		*			
Fairy Flycatcher	Stenostira scita	*	*				
Familiar Chat	Oenanthe familiaris	*	*				
Fiscal Flycatcher	Melaenornis silens	*	*				

Non-Priority Species		Transects turbine	Transects control	Focal point
Greater Striped Swallow	Cecropis cucullata	*		
Grey-backed Cisticola	Cisticola subruficapilla	*	*	
Grey-backed Sparrow-Lark	Eremopterix verticalis	*	*	
Hadeda Ibis	Bostrychia hagedash		*	
House Sparrow	Passer domesticus		*	
Karoo Chat	Emarginata schlegelii	*	*	
Karoo Eremomela	Eremomela gregalis	*	*	
Karoo Long-billed Lark	Certhilauda subcoronata	*	*	
Karoo Prinia	Prinia maculosa	*	*	
Karoo Scrub Robin	Cercotrichas coryphoeus	*	*	
Karoo Thrush	Turdus smithi	*		
Kittlitz's Plover	Charadrius pecuarius			*
Large-Billed Lark	Galerida magnirostris	*	*	
Lark-like Bunting	Emberiza impetuani	*	*	
Laughing Dove	Spilopelia senegalensis	*	*	
Layard's Tit-babbler	Sylvia layardi	*	*	
Little Grebe	Tachybaptus ruficollis			*
Little Swift	Apus affinis	*		
Long-billed Crombec	Sylvietta rufescens	*	*	
Long-billed Pipit	Anthus similis	*		
Malachite Sunbird	Nectarinia famosa		*	
Mountain Wheatear	Myrmecocichla monticola	*	*	
Namaqua Dove	Oena capensis		*	
Namaqua Sandgrouse	Pterocles namaqua		*	
Pale-winged Starling	Onychognathus nabouroup		*	
Pied Avocet	Recurvirostra avosetta			*
Pied Crow	Corvus albus	*	*	
Pied Starling	Lamprotornis bicolor		*	
Pririt batis	Batis pririt	*	*	
Red-billed Teal	Anas erythrorhyncha			*
Red-capped Lark	Calandrella cinerea		*	
Red-faced Mousebird	Urocolius indicus	*	*	
Rock Kestrel	Falco rupicolus	*		
Rock Martin	Ptyonoprogne fuligula	*		
Rufous-eared Warbler	Malcorus pectoralis	*	*	
South African Shelduck Southern Double-collared Sunbird	Tadorna cana Cinnyris chalybeus		*	*
Southern Fiscal	Lanius collaris	*	*	
Southern Grey-headed Sparrow	Passer diffusus	*		
Southern masked Weaver	Ploceus velatus	*	*	
Speckled Pigeon	Columba guinea	*	*	

Non-Priority Species		Transects turbine	Transects control	Focal point
Spike-heeled Lark	Chersomanes albofasciata	*	*	
White-backed Mousebird	Colius colius	*		
White-necked Raven	Corvus albicollis	*		
White-rumped Swift	Apus caffer	*		
White-throated Canary	Crithagra albogularis	*	*	
Yellow Canary	Crithagra flaviventris	*	*	
Yellow-bellied Eremomela	Eremomela icteropygialis	*	*	
79		54	52	12
		56	54	12

APPENDIX 4: Expertise of Specialist

Curriculum vitae: Chris van Rooyen

Profession/Specialisation	:	Avifaunal Specialist
Highest Qualification	:	BA LLB
Nationality	:	South African
Years of experience	:	26 years

Key Experience

Chris van Rooyen has twenty-two years' experience in the assessment of avifaunal interactions with industrial infrastructure. He was employed by the Endangered Wildlife Trust as head of the Eskom-EWT Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of co-operative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has consulted in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. He also has extensive project management experience and he has received several management awards from Eskom for his work in the Eskom-EWT Strategic Partnership. He is the author and/or co-author of 17 conference papers, co-author of two book chapters, several research reports and the current best practice guidelines for avifaunal monitoring at wind farm sites. He has completed around 130 power line assessments; and has to date been employed as specialist avifaunal consultant on more than 50 renewable energy generation projects. He has also conducted numerous risk assessments on existing power lines infrastructure. He also works outside the electricity industry and he has done a wide range of bird impact assessment studies associated with various residential and industrial developments. He serves on the Birds and Wind Energy Specialist Group which was formed in 2011 to serve as a liaison body between the ornithological community and the wind industry.

Key Project Experience

Bird Impact Assessment Studies and avifaunal monitoring for wind-powered generation facilities:

- Eskom Klipheuwel Experimental Wind Power Facility, Western Cape 1.
- 2. Mainstream Wind Facility Jeffreys Bay, Eastern Cape (EIA and monitoring)
- 3. Biotherm, Swellendam, (Excelsior), Western Cape (EIA and monitoring)
- 4. Biotherm, Napier, (Matjieskloof), Western Cape (pre-feasibility)
- 5. Windcurrent SA, Jeffreys Bay, Eastern Cape (2 sites) (EIA and monitoring)
- Caledon Wind, Caledon, Western Cape (EIA) 6.
- 7. Innowind (4 sites), Western Cape (EIA)
- 8. Renewable Energy Systems (RES) Oyster Bay, Eastern Cape (EIA and monitoring)
- Oelsner Group (Kerriefontein), Western Cape (EIA) 9
- 10. Oelsner Group (Langefontein), Western Cape (EIA)
- 11. InCa Energy, Vredendal Wind Energy Facility Western Cape (EIA)
- Mainstream Loeriesfontein Wind Energy Facility (EIA and monitoring) 12.
- Mainstream Noupoort Wind Energy Facility (EIA and monitoring) 13.
- Biotherm Port Nolloth Wind Energy Facility (Monitoring) 14.
- 15. Biotherm Laingsburg Wind Energy Facility (EIA and monitoring)
- Langhoogte Wind Energy Facility (EIA) 16.
- Vleesbaai Wind Energy Facility (EIA and monitoring) 17.
- 18. St. Helena Bay Wind Energy Facility (EIA and monitoring)
- Electrawind, St Helena Bay Wind Energy Facility (EIA and monitoring) Electrawind, Vredendal Wind Energy Facility (EIA) 19.
- 20.
- 21. SAGIT, Langhoogte and Wolseley Wind Energy facilities
- 22. Renosterberg Wind Energy Project – 12-month preconstruction avifaunal monitoring project
- De Aar North (Mulilo) Wind Energy Project 12-month preconstruction avifaunal monitoring 23.
- De Aar South (Mulilo) Wind Energy Project 12-month bird monitoring 24.
- Namies Aggenys Wind Energy Project 12-month bird monitoring Pofadder Wind Energy Project 12-month bird monitoring 25.
- 26.
- 27
- Dwarsrug Loeriesfontein Wind Energy Project 12-month bird monitoring
- Waaihoek Utrecht Wind Energy Project 12-month bird monitoring 28.
- 29. Amathole - Butterworth Utrecht Wind Energy Project - 12-month bird monitoring & EIA specialist
- 30. PhezukomEmaya and San Kraal Wind Energy Projects 12-month bird monitoring & EIA specialist study (Innowind)

project

- 31 Beaufort West Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mainstream)
- 32. Leeuwdraai Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mainstream)
- Sutherland Wind Energy Facility 12-month bird monitoring (Mainstream) 33.
- Maralla Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm) 34
- 35. Esizayo Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm)
- 36. Humansdorp Wind Energy Facility 12-month bird monitoring & EIA specialist study (Cennergi)
- Aletta Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm) 37.
- 38. Eureka Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm)
- 39. Makambako Wind Energy Faclity (Tanzania) 12-month bird monitoring & EIA specialist study (Windlab)
- 40. R355 Wind Energy Facility 12-month bird monitoring (Mainstream)
- Groenekloof Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mulilo) 41
- 42. Tsitsikamma Wind Energy Facility 24-months post-construction monitoring (Cennergi)
- 43. Noupoort Wind Energy Facility 24-months post-construction monitoring (Mainstream)
- 44. Kokerboom Wind Energy Facility 12-month bird monitoring & EIA specialist study (Business Venture Investments)
- 45 Kuruman Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mulilo)
- 46. Dassieklip Wind Energy Facility 3 years post-construction monitoring (Biotherm)
- 47. Loeriesfontein 2 Wind Energy Facility 2 years post-construction monitoring (Mainstream)
- Khobab Wind Energy Facility 2 years post-construction monitoring (Mainstream) 48 49
- Excelsior Wind Energy Facility 18 months construction phase monitoring (Biotherm) 50.
- Boesmansberg Wind Energy Facility 12-months pre-construction bird monitoring (juwi) 51. Mañhica Wind Energy Facility, Mozambique, 12-months pre-construction monitoring (Windlab)
- 52.
- Kwagga Wind Energy Facility, Beaufort West, 12-months pre-construction monitoring (ABO)

Pienaarspoort Wind Energy Facility, Touws River, Western Cape, 12-months pre-construction monitoring (ABO). 53.

Bird Impact Assessment Studies for Solar Energy Plants:

- Concentrated Solar Power Plant, Upington, Northern Cape. 1.
- 2. 3. Globeleq De Aar and Droogfontein Solar PV Pre- and Post-construction avifaunal monitoring
- JUWI Kronos PV project, Copperton, Northern Cape
- Sand Draai CSP project, Groblershoop, Northern Cape 4.
- 5. Biotherm Helena PV Project, Copperton, Northern Cape
- Biotherm Letsiao CSP Project, Aggeneys, Northern Cape Biotherm Enamandla PV Project, Aggeneys, Northern Cape
- 6. 7. 8. Biotherm Sendawo PV Project, Vryburg, North-West
- Biotherm Tlisitseng PV Project, Lichtenburg, North-West 9.
- JUWI Hotazel Solar Park Project, Hotazel, Northern Cape 10.
- Veld Solar One Project, Aggeneys, Northern Cape 11.
- 12. Brypaal Solar Power Project, Kakamas, Northern Cape
- ABO Vryburg 1,2,3 Solar PV Project, Vryburg, North-West NamPower CSP Facility near Arandis, Namibia 13.
- 14.
- Dayson Klip PV Facility near Upington, Northern Cape 15.
- 16. Geelkop PV Facility near Upington, Northern Cape

Bird Impact Assessment Studies for the following overhead line projects:

1.	Chobe 33kV Distribution line	
2.	Athene - Umfolozi 400kV	
3.	Beta-Delphi 400kV	
4.	Cape Strengthening Scheme 765kV	
5.	Flurian-Louis-Trichardt 132kV	
6.	Ghanzi 132kV (Botswana)	
7.	Ikaros 400kV	
8	Matimba-Witkop 400kV	
9	Naboomspruit 132kV	
10	Tabor-Elurian 132kV	
10.	Windhoek - Walvishaai 220 kV (Namihia)	
12	Witkon-Overvised 132kV	
12.	Winkup-Overysser TOZKV	
14	Adis Bhoshus 400kV	
14.		
15.	Diraya-dalus 400k/	
10.		
17.		
18.		
19.	Khanye 132kV (Botswana)	
20.	Moropule – Thamaga 220 kV (Botswana)	
21.	Parys 132kV	
22.	Simplon –Everest 132kV	
23.	Tutuka-Alpha 400kV	
24.	Simplon-Der Brochen 132kV	
25.	Big Tree 132kV	
26.	Mercury-Ferrum-Garona 400kV	
27.	Zeus-Perseus 765kV	
28.	Matimba B Integration Project	
29.	Caprivi 350kV DC (Namibia)	
30.	Gerus-Mururani Gate 350kV DC (Namibia)	
31.	Mmamabula 220kV (Botswana)	
32.	Steenberg-Der Brochen 132kV	
33.	Venetia-Paradise T 132kV	
34.	Burgersfort 132kV	
35.	Majuba-Umfolozi 765kV	
36.	Delta 765kV Substation	
37.	Braamhoek 22kV	
38	Steelpoort Merensky 400kV	
39	Mmamahula Delta 400kV	
40	Delta Ensilon 765kV	
40.	Gerus-Zambazi SOKV DC Interconnector: Review of proposed avian mitigation measures for the Okavango and	Ч
41.	Kwando River crossings	u
12	Givania 201/ Distribution line	
42.	Gyan Zzw Distribution me	
43.	Liquido de la contractiona di activita di la contractiona di activita di la contractica di activita di activita di la contractica di activita di activita di activita di activita di la contractica di activita di activ	
44.	A proposed power SO (V) Sportnet Fooder line between Sisten and Saldanha	
45.	A proposed new solver sponter requering between sistent and Saudanna	
40.	Carris 132Kv substation extension and associated power lines	
47.	Printice 132kv substation extension and associated power lines	
48.	Gyani 22kV	
49.		
50.	Nkomazi_Fig_iree 132kV	
51.	Peddie Rock 132kV	
52.	Reddersburg 132kV	
53.	Ihaba Combine 132kV	
54.	Nkomati 132kV	
55.	Louis Trichardt – Musina 132kV	
56.	Endicot 44kV	

57.	Apollo Lepini 400kV
58.	Tarlton-Spring Farms 132kV
59.	Kuschke 132kV substation
60. 61	Bendstore 66kV Substation and associated lines
62	Kuised 400KV (Namidia)
63	Watershed 132kV
64.	Bakone 132kV substation
65.	Eerstegoud 132kV LILO lines
66.	Kumba Iron Ore: SWEP - Relocation of Infrastructure
67.	Kudu Gas Power Station: Associated power lines
68.	Steenberg Booysendal 132kV
69. 70	Toulon Pumps 33kV
70. 71	Mitten Silica 132kV
72	Bakubung 132kV
73.	Nelsriver 132kV
74.	Rethabiseng 132kV
75.	Tilburg 132kV
76.	GaKgapane 66kV
77.	Knobel Gilead 132kV
78. 70	Bochum Khobel 132KV Medibong 122kV
79. 80	Withank Railway Line and associated infrastructure
81.	Spencer NDP phase 2 (5 lines)
82.	Akanani 132kV
83.	Hermes-Dominion Reefs 132kV
84.	Cape Pensinsula Strengthening Project 400kV
85.	Magalakwena 132kV
86.	Benficosa 132kV
07. 88	Dililabaneng Tozkv Taunus Dienkloof 132kV
89	Taunus Doornkop 132kV
90.	Tweedracht 132kV
91.	Jane Furse 132kV
92.	Majeje Sub 132kV
93.	Tabor Louis Trichardt 132kV
94. 05	Riversong 88KV Memeteekele 122kV
95. 96	Kahokweni 132kV
97.	MDPP 400kV Botswana
98.	Marble Hall NDP 132kV
99.	Bokmakiere 132kV Substation and LILO lines
100.	Styldrift 132kV
101.	launus – Diepkloof 132kV
102.	Waterkloof 88kV
103.	Camden – Theta 765kV
105.	Dhuva – Minerva 400kV Diversion
106.	Lesedi –Grootpan 132kV
107.	Waterberg NDP
108.	Bulgerivier – Dorset 132kV
109.	Bulgerivier – Toulon 132kV Nokong Eluorepar 132kV
110.	Mantsole 132kV
112.	Tshilamba 132kV
113.	Thabamoopo - Tshebela – Nhlovuko 132kV
114.	Arthurseat 132kV
115.	Borutho 132kV MTS
116.	Volspruit - Potgletersrus 132KV Naatal Optia Eibra Cabla Installation Project: Western Capa
117.	Mediel Optic Fible Cable Installation Floject, Western Cape Matla-Glockner 400kV
118.	Delmas North 44kV
119.	Houwhoek 11kV Refurbishment
120.	Clau-Clau 132kV
121.	Ngwedi-Silwerkrans 134kV
122.	Nieuwehoop 400kV walk-through
123.	Tarlton 132kV
125.	Medupi - Witkop 400kV walk-through
126.	Germiston Industries Substation
127.	Sekgame 132kV
128.	Botswana – South Africa 400kV Transfrontier Interconnector
129.	Syferkuil – Rampheri 132kV
130.	Queens Substation and associated 132KV powerlines
131.	Aries – Helios – Juno walk-down
133.	Kuruman Phase 1 and 2 Wind Energy facilities 132kV Grid connection
	Transport

Bird Impact Assessment Studies for the following residential and industrial developments:

- 1. Lizard Point Golf Estate
- 2. Lever Creek Estates
- 3. Leloko Lifestyle Estates
- 4. Vaaloewers Residential Development
- 5. Clearwater Estates Grass Owl Impact Study
- 6. Sommerset Ext. Grass Owl Study
- 7. Proposed Three Diamonds Trading Mining Project (Portion 9 and 15 of the Farm Blesbokfontein)
- N17 Section: Springs To Leandra "Borrow Pit 12 And Access Road On (Section 9, 6 And 28 Of The Farm Winterhoek 314 Ir)
- 9. South African Police Services Gauteng Radio Communication System: Portion 136 Of The Farm 528 Jq, Lindley.
- 10. Report for the proposed upgrade and extension of the Zeekoegat Wastewater Treatment Works, Gauteng.
- 11. Bird Impact Assessment for Portion 265 (a portion of Portion 163) of the farm Rietfontein 189-JR, Gauteng.
- 12. Bird Impact Assessment Study for Portions 54 and 55 of the Farm Zwartkop 525 JQ, Gauteng.
- 13. Bird Impact Assessment Study Portions 8 and 36 of the Farm Nooitgedacht 534 JQ, Gauteng.
- 14. Shumba's Rest Bird Impact Assessment Study
- 15. Randfontein Golf Estate Bird Impact Assessment Study
- 16. Zilkaatsnek Wildlife Estate
- 17. Regenstein Communications Tower (Namibia)
- 18. Avifaunal Input into Richards Bay Comparative Risk Assessment Study
- 19. Maquasa West Open Cast Coal Mine
- 20. Glen Erasmia Residential Development, Kempton Park, Gauteng
- 21. Bird Impact Assessment Study, Weltevreden Mine, Mpumalanga
- 22. Bird Impact Assessment Study, Olifantsvlei Cemetery, Johannesburg
- 23. Camden Ash Disposal Facility, Mpumalanga
- 24. Lindley Estate, Lanseria, Gauteng
- 25. Proposed open cast iron ore mine on the farm Lylyveld 545, Northern Cape
- 26. Avifaunal monitoring for the Sishen Mine in the Northern Cape as part of the EMPr requirements
- 27. Steelpoort CNC Bird Impact Assessment Study

Professional affiliations

I work under the supervision of and in association with Albert Froneman (MSc Conservation Biology) (SACNASP Zoological Science Registration number 400177/09) as stipulated by the Natural Scientific Professions Act 27 of 2003.

Ami un Raufe

Chris van Rooyen 22 May 2023

Expertise of Specialist

Curriculum vitae: Albert Froneman (Pr.Sci.Nat Registration no: 400177/09)

Profession/Specialisation	:	Avifaunal Specialist
Highest Qualification	:	MSc (Conservation Biology)
Nationality	:	South African
Years of experience	:	24 years

Key Qualifications

Albert Froneman (Pr.Sci.Nat) has more than 24 years' experience in the management of avifaunal interactions with industrial infrastructure. He holds a M.Sc. degree in Conservation Biology from the University of Cape Town. He managed the Airports Company South Africa (ACSA) - Endangered Wildlife Trust Strategic Partnership from 1999 to 2008 which has been internationally recognized for its achievements in addressing airport wildlife hazards in an environmentally sensitive manner at ACSA's airports across South Africa. Albert is recognized worldwide as an expert in the field of bird hazard management on airports and has worked in South Africa, Swaziland, Botswana, Namibia, Kenya, Israel, and the USA. He has served as the vice chairman of the International Bird Strike Committee and has presented various papers at international conferences and workshops. At present he is consulting to ACSA with wildlife hazard management on all their airports. He also an accomplished specialist ornithological consultant outside the aviation industry and has completed a wide range of bird impact assessment studies. He has co-authored many avifaunal specialist studies and pre-construction monitoring reports for proposed renewable energy developments across South Africa. He also has vast experience in using Geographic Information Systems to analyse and interpret avifaunal data spatially and derive meaningful conclusions. Since 2009 Albert has been a registered Professional Natural Scientist (reg. nr 400177/09) with The South African Council for Natural Scientific Professions, specialising in Zoological Science.

Key Project Experience

Renewable Energy Facilities -avifaunal monitoring projects in association with Chris van Rooyen Consulting

- Jeffrey's Bay Wind Farm 12-months preconstruction avifaunal monitoring project 1.
- 2. Oysterbay Wind Energy Project - 12-months preconstruction avifaunal monitoring project
- Ubuntu Wind Energy Project near Jeffrey's Bay 12-months preconstruction avifaunal monitoring project 3.
- Bana-ba-Pifu Wind Energy Project near Humansdorp 12-months preconstruction avifaunal monitoring project 4.
- 5. Excelsior Wind Energy Project near Caledon - 12-months preconstruction avifaunal monitoring project
- Laingsburg Spitskopvlakte Wind Energy Project 12-months preconstruction avifaunal monitoring project 6.
- Loeriesfontein Wind Energy Project Phase 1, 2 & 3 12-months preconstruction avifaunal monitoring project 7.
- Noupoort Wind Energy Project 12-months preconstruction avifaunal monitoring project Vleesbaai Wind Energy Project 12-months preconstruction avifaunal monitoring project 8.
- 9.
- 10. Port Nolloth Wind Energy Project - 12-months preconstruction avifaunal monitoring project
- Langhoogte Caledon Wind Energy Project 12-months preconstruction avifaunal monitoring project Lunsklip Stilbaai Wind Energy Project 12-months preconstruction avifaunal monitoring project 11.
- 12.
- 13. Indwe Wind Energy Project - 12-months preconstruction avifaunal monitoring project
- Zeeland St Helena bay Wind Energy Project 12-months preconstruction avifaunal monitoring project 14.
- 15. Wolseley Wind Energy Project - 12-months preconstruction avifaunal monitoring project
- 16. Renosterberg Wind Energy Project - 12-months preconstruction avifaunal monitoring project
- De Aar North (Mulilo) Wind Energy Project 12-months preconstruction avifaunal monitoring project (2014) 17.
- 18. De Aar - South (Mulilo) Wind Energy Project - 12-months bird monitoring
- Namies Aggenys Wind Energy Project 12-months bird monitoring Pofadder Wind Energy Project 12-months bird monitoring 19.
- 20.
- Dwarsrug Loeriesfontein Wind Energy Project 12-months bird monitoring 21
- Waaihoek Utrecht Wind Energy Project 12-months bird monitoring 22.
- 23. Amathole - Butterworth Utrecht Wind Energy Project - 12-months bird monitoring & EIA specialist study
- 24. De Aar and Droogfontein Solar PV Pre- and Post-construction avifaunal monitoring
- 25. Makambako Wind Energy Faclity (Tanzania) 12-month bird monitoring & EIA specialist study (Windlab)
- 26. R355 Wind Energy Facility 12-month bird monitoring (Mainstream)
- 27. Groenekloof Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mulilo)
- Tsitsikamma Wind Energy Facility 24-months post-construction monitoring (Cennergi) 28.
- 29. Noupoort Wind Energy Facility 24-months post-construction monitoring (Mainstream)
- 30. Kokerboom Wind Energy Facility 12-month bird monitoring & EIA specialist study (Business Venture Investments)
- 31. Kuruman Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mulilo)
- Mañhica Wind Energy Facility 12-month bird monitoring & EIA specialist study (Windlab) 32.
- 33. Kwagga Wind Energy Facility, Beaufort West, 12-months pre-construction monitoring (ABO)
- 34. Pienaarspoort Wind Energy Facility, Touws River, Western Cape, 12-months pre-construction monitoring (ABO).

Bird Impact Assessment studies and / or GIS analysis:

1. Aviation Bird Hazard Assessment Study for the proposed Madiba Bay Leisure Park adjacent to Port Elizabeth Airport.

Extension of Runway and Provision of Parallel Taxiway at Sir Seretse Khama Airport, Botswana Bird / Wildlife Hazard 2. Management Specialist Study

- 3. Maun Airport Improvements Bird / Wildlife Hazard Management Specialist Study
- Bird Impact Assessment Study Bird Helicopter Interaction The Bitou River, Western Cape Province South Africa 4 Proposed La Mercy Airport - Bird Aircraft interaction specialists study using bird detection radar to assess swallow flocking 5. behaviour
- 6. KwaZulu Natal Power Line Vulture Mitigation Project - GIS analysis
- Perseus-Zeus Powerline EIA GIS Analysis 7.
- Southern Region Pro-active GIS Blue Crane Collision Project. 8.
- Specialist advisor ~ Implementation of a bird detection radar system and development of an airport wildlife hazard 9. management and operational environmental management plan for the King Shaka International Airport
- 10. Matsapha International Airport - bird hazard assessment study with management recommendations
- 11. Evaluation of aviation bird strike risk at candidate solid waste disposal sites in the Ekurhuleni Metropolitan Municipality

- 12. Gateway Airport Authority Limited - Gateway International Airport, Polokwane: Bird hazard assessment; Compile a bird hazard management plan for the airport
- Bird Specialist Study Evaluation of aviation bird strike risk at the Mwakirunge Landfill site near Mombasa Kenya 13
- 14. Bird Impact Assessment Study - Proposed Weltevreden Open Cast Coal Mine Belfast, Mpumalanga
- 15. Avian biodiversity assessment for the Mafube Colliery Coal mine near Middelburg Mpumalanga
- Avifaunal Specialist Study SRVM Volspruit Mining project Mokopane Limpopo Province 16
- Avifaunal Impact Assessment Study (with specific reference to African Grass Owls and other Red List species) Stone Rivers 17. Arch
- 18. Airport bird and wildlife hazard management plan and training to Swaziland Civil Aviation Authority (SWACAA) for Matsapha and Sikhupe International Airports
- Avifaunal Impact Scoping & EIA Study Renosterberg Wind Farm and Solar PV site 19.
- 20. Bird Impact Assessment Study - Proposed 60 year Ash Disposal Facility near to the Kusile Power Station
- 21. Avifaunal pre-feasibility assessment for the proposed Montrose dam. Mpumalanda
- Bird Impact Assessment Study Proposed ESKOM Phantom Substation near Knysna, Western Cape 22
- 23. Habitat sensitivity map for Denham's Bustard, Blue Crane and White-bellied Korhaan in the Kouga Municipal area of the Eastern Cape Province
- Swaziland Civil Aviation Authority Sikhuphe International Airport Bird hazard management assessment 24.
- 25. Avifaunal monitoring - extension of Specialist Study - SRVM Volspruit Mining project - Mokopane Limpopo Province
- 26. Avifaunal Specialist Study - Rooikat Hydro Electric Dam - Hope Town, Northern Cape
- 27. The Stewards Pan Reclamation Project - Bird Impact Assessment study
- 28 Airports Company South Africa - Avifaunal Specialist Consultant - Airport Bird and Wildlife Hazard Mitigation

Geographic Information System analysis & maps

- ESKOM Power line Makgalakwena EIA GIS specialist & map production 1
- 2. ESKOM Power line Benficosa EIA - GIS specialist & map production
- 3. ESKOM Power line Riversong EIA – GIS specialist & map production
- 4. ESKOM Power line Waterberg NDP EIA - GIS specialist & map production
- ESKOM Power line Bulge Toulon EIA GIS specialist & map production 5.
- ESKOM Power line Bulge DORSET EIA GIS specialist & map production 6.
- 7. ESKOM Power lines Marblehall EIA - GIS specialist & map production
- ESKOM Power line Grootpan Lesedi EIA GIS specialist & map production 8.
- 9. ESKOM Power line Tanga EIA – GIS specialist & map production
- 10. ESKOM Power line Bokmakierie EIA - GIS specialist & map production
- ESKOM Power line Rietfontein EIA GIS specialist & map production 11
- Power line Anglo Coal EIA GIS specialist & map production 12.
- 13. ESKOM Power line Camcoll Jericho EIA - GIS specialist & map production
- Hartbeespoort Residential Development GIS specialist & map production 14.
- ESKOM Power line Mantsole EIA GIS specialist & map production 15.
- 16. ESKOM Power line Nokeng Flourspar EIA - GIS specialist & map production
- ESKOM Power line Greenview EIA GIS specialist & map production 17.
- 18. Derdepoort Residential Development - GIS specialist & map production
- ESKOM Power line Boynton EIA GIS specialist & map production 19
- ESKOM Power line United EIA GIS specialist & map production 20.
- ESKOM Power line Gutshwa & Malelane EIA GIS specialist & map production 21.
- 22. ESKOM Power line Origstad EIA - GIS specialist & map production
- Zilkaatsnek Development Public Participation -map production 23.
- 24. Belfast - Paarde Power line - GIS specialist & map production
- Solar Park Solar Park Integration Project Bird Impact Assessment Study avifaunal GIS analysis. 25.
- 26. Kappa-Omega-Aurora 765kV Bird Impact Assessment Report - Avifaunal GIS analysis.
- 27. Gamma – Kappa 2nd 765kV – Bird Impact Assessment Report – Avifaunal GIS analysis.
- ESKOM Power line Kudu-Dorstfontein Amendment EIA GIS specialist & map production. 28.
- 29. Proposed Heilbron filling station EIA - GIS specialist & map production
- ESKOM Lebatlhane EIA GIS specialist & map production 30.
- ESKOM Pienaars River CNC EIA GIS specialist & map production 31.
- ESKOM Lemara Phiring Ohrigstad EIA GIS specialist & map production 32.
- ESKOM Pelly-Warmbad EIA GIS specialist & map production ESKOM Rosco-Bracken EIA GIS specialist & map production 33.
- 34.
- ESKOM Ermelo-Uitkoms EIA GIS specialist & map production 35.
- ESKOM Wisani bridge EIA GIS specialist & map production 36.
- City of Tswane New bulkfeeder pipeline projects x3 Map production 37
- 38. ESKOM Lebohang Substation and 132kV Distribution Power Line Project Amendment GIS specialist & map production
- ESKOM Geluk Rural Powerline GIS & Mapping 39.
- 40. Eskom Kimberley Strengthening Phase 4 Project GIS & Mapping
- 41. ESKOM Kwaggafontein - Amandla Amendment Project GIS & Mapping
- 42. ESKOM Lephalale CNC - GIS Specialist & Mapping
- ESKOM Marken CNC GIS Specialist & Mapping 43.
- ESKOM Lethabong substation and powerlines GIS Specialist & Mapping 44
- 45 ESKOM Magopela- Pitsong 132kV line and new substation - GIS Specialist & Mapping

Professional affiliations

South African Council for Natural Scientific Professions (SACNASP) registered Professional Natural Scientist (reg. nr 400177/09) specialist field: Zoological Science. Registered since 2009.

mon

Signature of the Specialist

Albert Froneman 22 May 2023

APPENDIX 5: POST-CONSTRUCTION MANAGEMENT PLAN

1 INTRODUCTION

The avifaunal post-construction monitoring at the proposed WEF must be conducted in accordance with the latest version (2015) of the *Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa* (Jenkins *et al.* 2015)².

2 AIM OF POST-CONSTRUCTION MONITORING

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

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

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

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

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

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

3 TIMING

Post-construction monitoring should commence as soon as possible after the first turbines become operational to ensure that the immediate effects of the facility on resident and passing birds are recorded, before they have time to adjust or habituate to the development. However, it should be borne in mind that it is also important to obtain an understanding of the impacts of the facility as they would be over the lifespan of the facility. Over time the habitat within the WEF may change, birds may become habituated to, or learn to avoid the facility. It is therefore necessary to monitor over a longer period than just an initial one year.

4 DURATION

Monitoring should take place in Year 1 and 2 of the operational phase, and then repeated in Year 5 and every five years after that. After the first year of monitoring, the programme should be reviewed in order to incorporate significant findings that have emerged. This may entail the revision of the number of turbines to be searched, and the size of the search plots, depending on the outcome of the first year of monitoring. If significant impacts are observed, i.e. exceeding predetermined thresholds, and mitigation is required, the

² Jenkins, A.R., Van Rooyen, C.S., Smallie, J.J., Anderson, M.D., & A.H. Smit. 2015. Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa. Produced by the Wildlife & Energy Programme of the Endangered Wildlife Trust & BirdLife South Africa.

matter should be taken up with the operator to discuss potential mitigation. In such instances the scope of monitoring could be reduced to focus only on the impacts of concern.

5 HABITAT CLASSIFICATION

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

6 BIRD NUMBERS AND MOVEMENTS

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

7 MORTALITIES

The mortality monitoring must have four components:

- Experimental assessment of search efficiency and scavenging rates of bird carcasses on the site at least twice a year.
- Weekly searches in the immediate vicinity of the wind farm turbines for collision casualties.
- Estimation of collision rates at the end of each year of post construction monitoring. Observed
 mortality rates need to be adjusted to account for searcher efficiency and scavenger removal.
 There have been many different formulas proposed to estimate mortality rates. The available
 methodologies must be investigated, and an appropriate method will be applied. The current
 method which is used widely is the GenEst method.
- Monthly inspections of the overhead powerlines to look for potential collision and electrocution mortalities.

8 SEARCHER EFFICIENCY AND SCAVENGER REMOVAL

The value of surveying the area for collision victims is only valid if some measure of the accuracy of the survey method is developed. The probability of a carcass being detected and the rate of removal/decay of the carcass must be accounted for when estimating collision rates and when designing the monitoring protocol. This must be done in the form of searcher and scavenger trails at least twice a year.

9 CARCASS SURVEYS

9.1 Aligning search protocols.

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

9.2 Methodology

- The search plots must be defined by the avifaunal specialist.
- A team of searchers and one supervisor must be trained to implement the carcass searches.
- Searches must begin as early in the mornings as possible to reduce carcass removal by scavengers.
- Carcass searchers must walk in straight line transects, 6 m apart, covering 3 m on each side.
- The searchers must have a vehicle available for transport per site.

- The supervisor must assist with the collation of the data and to provide the data to the avifaunal specialist in electronic format on a weekly basis.
- The avifaunal specialist must ensure that the supervisor is completely familiar with all the procedures concerning the management of the data.
- The following must be loaded on a cloud server on a weekly basis for the avifaunal specialist to access:
 - o Carcass fatality data (hardcopy and scans as well as data entered into Excel spreadsheets);
 - Pictures of any carcasses, properly labelled
 - GPS tracks of the search plots walked; and
 - Spreadsheet indicating the turbines searched on a weekly basis.

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

10 DELIVERABLES

10.1 Annual report

A post-construction monitoring report must be completed by the avifaunal specialist at the end of each year of operational monitoring. As a minimum, the report must attempt to answer the following questions:

- How has the habitat available to birds in and around the WEF changed?
- How has the number birds and species composition changed?
- How have the movements of priority species changed?
- How has the WEF affected priority species' breeding success?
- What are the likely drivers of any changes observed?
- What is the significance of any impacts observed?
- What mitigation measures are required to reduce the impacts?

10.2 Quarterly reports

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



Name: Cell: E-mail: Date: Ref:

Morné de Jager 082 565 4059 morne@menco.co.za 26 June 2023 Koup 2 WEF

240 Main Road 1st Floor Great Westerford Rondebosch 7700

Attention: Ms. Tebogo Mapinga

Dear Madam

SPECIALIST OPINION: PROPOSED KOUP 2 WIND ENERGY FACILITY

The above-mentioned issue as well as the report titled: "SiVEST, 2022: Environmental Noise Impact Assessment - Proposed construction of the Koup 2 Wind Energy Facility and associated Grid Infrastructure, near Beaufort West, Western Cape Province, South Africa. Enviro-Acoustic Research, Pretoria".

This 2022 report covered the potential noise impact associated with the construction and operation of the Koup 2 Wind Energy Facility ("WEF"). The potential noise impact of the proposed Koup 2 WEF was evaluated using a sound propagation model. Conceptual scenarios were developed for the construction and operation phases. With the modelled input data as used, this assessment indicated a:

- low significance for daytime activities related to the construction of the substation, hard standing areas, digging foundations, civil work as well as the erection of the wind turbines;
- medium significance for night-time activities relating to the construction of civil work as well as the erection of the wind turbines. Mitigation is proposed to reduce the significance to low;
- **medium significance** for activities relating to the construction of access roads. Mitigation is proposed to reduce the significance to low;
- medium significance for activities relating to construction traffic passing the dwellings of NSD. Mitigation is proposed to reduce the significance to low;
- low significance for both day- and night-time operational activities, considering the sound power emission level ("SPL") of the Acciona AW116/3000 with a maximum SPL of 108.3 dBA (re 1 pW).

Enviro-Acoustic Research cc was subsequently commissioned by the ARCUS Consulting South Africa SA (Pty) Ltd ("ARCUS") to reassess the potential noise impact from the construction and operation of the proposed Koup 1 Wind Energy Facility ("WEF") (and associated infrastructure) on the surrounding area.

This review also included a brief review of the potential noise levels from the Koup 2 WEF (both the operational and cumulative scenario). Operational noise modelling considered a wind turbine with a maximum sound power emission level ("SPL") of 112.2 dBA (re 1 pW).

The applicant is proposing a number of changes to the Koup 1 and Koup 2 WEFs and it was requested to review the potential changes in the noise impact and whether it would result in a change in the findings and recommendations of the previous ENIA. Potential changes would include:

- A change in the Wind Turbine Generator ("WTG") layout; and
- A change in the potential WTG.

When using the SPL of a wind turbine with a SPL of 112.2 dBA (re 1 pW), noise levels will be less than 45 at all noise-sensitive receptors identified for the Koup 2 WEF, with noise rating level of 44.9 dBA at NSR09. There will however be a slight increase in the noise levels when both the Koup 1 and Koup 2 WEFs are operational, with a projected noise level of 45.4 dBA at NSR09. Mitigation measures proposed to reduce the potential noise levels at NSR03, NSR04 and NSR05 for the Koup 1 WEF project will be acceptable to manage the noise levels at NSR09.

It is recommended that the applicant reassess the noise levels associated with the Koup 2 WEF, once the layout is finalized and if the applicant is using a WTG with a SPL of 112 dBA. This is to ensure that total noise levels are less than 45 dBA at all dwellings used for residential purposes (for both the operational and cumulative scenarios).

It is also recommended that the applicant re-evaluates the noise impact:

- 1. should the Koup 2 layout be revised where:
 - a. any WTG, located within 1,500 m from any NSR are moved closer;
 - b. the number of WTG within 2,500 m from any NSR are increased; and
- 2. should the applicant make use of a wind turbine with a maximum SPL exceeding 112.2 dBA re 1 pW.

To ensure that noise does not become an issue for future residents, landowners or the local communities, it is recommended that the applicant get written agreement from current landowners/community leaders that no new residential dwellings will be developed within areas enveloped by the 42dBA noise level contour (of the Koup 2 WEF). Dwellings and structures located within the 45dBA noise rating level contour should not be used for permanent residential activities.

Should you require any further details, or have any additional questions, please do not hesitate to call me on the above numbers.

Yours Faithfully,

Morné de Jager Enviro-Acoustic Research cc



Figure 1: Potential Cumulative noise levels as calculated for the Koup 1 WEF



Terrestrial Biodiversity Walkdown Report

Koup 2 Wind Energy Facility

Date: 16/05/2023 Version: Final Author: J. Pote
Terrestrial Biodiversity Walkdown Report

Koup 2 Wind Energy Facility

Compiled by: Jamie Pote (Pr. Sci. Nat.)

Postnet Suite 57, Private Bag X13130, Humewood, Port Elizabeth, 6013, South Africa jamiepote@live.co.za +27 (0)76 888 9890

Compiled for: Arcus Consultancy Services South Africa (Pty) Ltd

Date of report: 16/05/2023

Final

This Report has been prepared with all reasonable skill, care and diligence within the scope of appointment by Mr Jamie Pote, with consideration to the resources devoted to it by agreement with the client, incorporating our Standard Terms and Conditions of Business. This Report is prepared exclusively for use by the client, and the author disclaims any liability in respect of its use by any party other than the client and for the purpose for which it was written. The Report is subject to all the copyright and intellectual property laws and practices of South Africa and contains intellectual property and proprietary information that is protected by such copyright in favour of the author. No person, other than the client, may reproduce, distribute to any third party, or rely on the content of any portion of this report, without the prior written consent of the author.

The author accepts no responsibility of whatsoever nature to third parties to whom this Report, or any part thereof, is made known. Any such persons or parties rely on the report at their own risk.

Revisions

Report/Revision Version	Date:	Approved/Reviewed by:
First Draft	24/02/2023	Jamie Pote
Final Draft	16/05/2023	Jamie Pote
IAP comments		
Final Version (ver 1.0)		

Table of Contents

Revisions	ii
Fable of Contents	
st of Figures	
List of Tables	ii
List of Maps	ii
1 Introduction & Background	
1.1 Project Description	
1.2 Purpose of Report	
1.3 Methodology	5
1.4 Data sources and references	5
1.5 Assumptions and Limitations	6
1.6 National Environmental Screening Tool	6
2 General Terrestrial Biodiversity	
2.1 Vegetation Units and Habitats	
2.2 Protected Flora	
2.3 Faunal Habitat and Communities	15
2.3.1 Mammals	
2.3.2 Reptiles	
2.3.3 Amphibians	
2.3.4 Invertebrates	
2.4 Bioregional Planning	
2.5 Site Sensitivity Assessment	
3 Walkdown Findings	22
3.1 Vegetation	
3.2 Flora Species of Conservation Concern	
3.3 Fauna Species of Conservation Concern	24
3.4 Sensitive Areas and Species Populations	
3.5 Turbines, Roads and other Infrastructure	
4 Walkdown Conclusions and Recommendations	
5 Appendices	
5.1 Appendix 1: References	
5.2 Appendix 2: Abbreviations & Glossary	
5.2.1 Abbreviations	
5.2.2 Glossary	
5.3 Appendix 3: Specialist Profile and Professional Registra	ition 46

List of Figures

Figure 1: Site Locality (indicated in yellow)	3
Figure 2: Terrestrial Biodiversity Sensitivity	7
Figure 3: Plant Species Sensitivity	7

Figure 4: Animal Species Sensitivity	7
Figure 5: Aquatic Sensitivity	7
Figure 6: Regional Vegetation Units	. 9
Figure 7: Bioregional Planning (Critical Biodiversity Areas)	18
Figure 8: Original assessment site vegetation sensitivity (Todd, 2022)	20
Figure 9: Site Vegetation and Sensitivity overlain on original mapped sensitivity (as per Todd, 2022	<u>2</u>).
Revised positions indicated in blue	21
Figure 10: Analysis of turbine positions and other WEF infrastructure (Koup 1 – red, Koup 2 - yellow	v).
	26

List of Tables

Table 1:	Gamka Karoo (NKI 1)11
Table 2:	Upper Karoo Hardeveld (NKI 2)13
Table 3:	Southern Karoo Riviere (AZi 6)14
Table 4: Sta	atus of flora species of conservation concern confirmed to be present as per Todd (2022)
with addition	onal walkdown observations23
Table 5: List	ted fauna species of conservation concern confirmed to be present as per Todd (2022)25
Table 6: Su	mmary of WEF and infrastructure vegetation and sensitivities and recommended layout
adjustment	S27
Table 7: Red	commended layout adjustment maps and photos 29

List of Maps

No table of figures entries found.

1 Introduction & Background

1.1 Project Description

The proposed Koup 2 WEF will comprise up to Thirty-two (32) wind turbines with a maximum total energy generation capacity of approximately 140 MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. The location of the site, to the south-west of Beaufort West in the Western Cape province, is indicated in Figure 1 below, indicated in yellow.

Koup 2 is part of a cluster of two WEF facilities namely Koup 1 (indicated in yellow - east) and Koup 2 (indicated in red - west), which have a shared access road. While the walkdown component of this report pertains specifically to Koup 2, portions of the background components of this report may apply to both facilities, as they share a similar biophysical environment and area of influence.



Project : Koup WEF

Figure 1: Site Locality (indicated in yellow)

1.2 Purpose of Report

The Wind Energy Facility Ecological walkdown has been undertaken in fulfilment of specific conditions contained in the environmental authorisation (Reg. No. 14/12/16/3/3/2/2121) dated 22 September 2022 and subsequent amendments issued by Department of Forestry, Fisheries and the Environment for the project, as follows:

• <u>Condition 13:</u> A final site layout plan for the Koup 1 WEF and its associated infrastructure near Beaufort West in the Western Cape Province, as determined by the detailed engineering phase and micro-siting of the wind turbine positions, and all mitigation measures as dictated by the final site layout plan, must be submitted to the Department for approval prior to construction. A copy of the

final site layout map must be made available for comments to registered Interested and Affected Parties and the holder of this Environmental Authorisation must consider such comments. Once amended, the final development layout map must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following:

- 13.1. The position of wind turbines and associated infrastructure;
- 13.2. Internal and access roads indicating width;
- 13.3. The BESS, substation(s) inverters and / or transformer(s) sites including their entire footprints;
- 13.4. Connection routes (including pylon positions) to the distribution/transmission network;
- 13.5. Buildings, including accommodation;
- 13.6. All existing infrastructure on the site;
- 13.7. Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;

13.8. All sensitive features e.g., Important Bird Areas, Critical Biodiversity Areas, Ecological Support Areas, heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure; and

13.9. All "no-go" and buffer areas.

- <u>Condition 39</u>: A pre-construction walk through of the approved power line alignment and turbine positions by a bat specialist, avifaunal specialist and ecologist, must be conducted to ensure that the micro-siting of the turbines, pylons and power line alignment have the least possible impact, there are no nests sites of priority species on or close to the construction corridor, and all protected plant species impacted are identified.
- <u>Condition 43:</u> The 'no-go' areas of the development property must be clearly demarcated and must be excluded from the final layout plan.
- <u>Condition 44</u>: All watercourses and associated wetlands are regarded as sensitive. All developments within 500 m of watercourses must comply with the National Water Act.
- <u>Condition 45</u>: No transmission line towers, substations and construction camps will be placed within the delineated water courses as well as their respective buffers without obtaining the required approvals. A 32 m buffer must be applied along all identified watercourses and a 50m buffer must be applied along all identified wetlands.
- <u>Condition 46:</u> A pre-construction survey of the final development footprint must be conducted by a qualified floral specialist to identity protected species affected by the proposed development. Prior to the commencement of construction, a rescue and rehabilitation operation for these species which could survive translocation must be conducted.
- <u>Condition 47</u>: Construction activities must be restricted to demarcated areas to restrict the impact on sensitive environmental features.
- <u>Condition 54:</u> Where roads pass right next to major water bodies, provision shall be made for fauna such as toads to pass under the roads by using culverts or similar structures.
- <u>Condition 55:</u> Bridge design must be such that it minimise impact to riparian areas with minimal alterations to water flow and must allow the movement of fauna and flora.
- <u>Condition 56:</u> The final development area should be surveyed for species suitable for search and rescue, which should be trans-located prior to the commencement of construction.
- <u>Condition 59</u>: Wetlands, rivers and river riparian areas must be treated as "no-go" areas and appropriately demarcated as such.

The primary purpose of the ecological walkdown, as per the EA conditions are to ensure that the micrositing of the turbines and power line has the least possible impact and all protected plant species impacted are identified. As a secondary outcome a species list of protected species as well as species suited to translocation is provided. Some conditions outlines above are pertinent to aquatic rather than terrestrial environment and are subject to an aquatic specialist walkdown, however the terrestrial and aquatic environment are linked and hence consideration will be given to aquatic aspects where relevant during the walkdown.

This report is one of two undertaken for a pair of adjacent Wind Energy Facility Projects within an overlapping Area of Influence, namely Koup 1 (east) and Koup 2 (west). The general descriptions provided in this report are thus an overview of the broader area and may contain information that has been summarised from separate but contiguous or overlapping site assessments in order to more effectively contextualise the broader environment and the area of influence as well as to better understand the 'bigger picture', since the natural environment is interconnected, and as will become evident the local environment is strongly influenced by the surrounding area.

1.3 Methodology

The site walkdown was undertaken in the time-period between <u>o6 and 20 February 2023</u>. The site walkdown was during late summer after a reasonably good summer rainfall period. While the seasonal response of local flora does vary throughout the year, with certain species flowering during different seasons, the time during which the walkdown was undertaken is deemed to have been undertaken during an adequate seasonal period. It is possible that certain flora was not visible at the time of the walkdown, including certain geophytic species, that are active in spring and early summer may have been dormant or less visible at the time of the walkdown. The main purpose of the walkdown has been to microsite and refine turbines footprints and other infrastructure based on landscape level ecological processes and identification of potentially sensitive habitat that could be avoided. As a secondary measure the original species list(s) have been updated with several additional species in order to better inform permit application and flora and fauna search and rescue requirements but is also informed by the findings of the original assessment.

1.4 Data sources and references

A comprehensive list of references, including data sources is provided in Section 5. Data sources that

were utilised for the walkdown and report include the following:

- National (DFFE) Web Based Screening Tool to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA)
 lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) potential faunal species.
- Global Biodiversity Information Facility (GBIF) potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) for bird species records.
- National Red Books and Lists mammals, reptiles, frogs, dragonflies & butterflies.

- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) protected area information.
- Critical Biodiversity Areas of the Northern Cape (2016) Bioregional Plan.
- SANBI BGIS All other biodiversity GIS datasets.
- Aerial Imagery Google Earth, Esri, Chief Surveyor General (<u>http://csg.dla.gov.za</u>).
- Cadastral and other topographical country data Chief Surveyor General (<u>http://csg.dla.gov.za</u>).
- Original Ecological conducted for the project, excluding bats and avifauna by Todd (2022)
- Other sources include peer-reviewed journals, regional and local assessments and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

1.5 Assumptions and Limitations

- The site visit was undertaken in late summer 2023, at the end of a reasonable rainy season and it is possible that certain spring flowering flora groups including geophytes may not have been visible. The site visit was deemed adequate however for micro siting purposes, supplemental to other information sources.
- Threatened and protected species are by their nature elusive to find and can be missed when surveying extensive areas. All reasonable measures have been taken to minimise this risk.
- Flora species are known to grow and flower at slightly different times of the year and in some cases do not lower every year, hence it is possible that certain species may not have been representing at the time of survey. The time period of the survey was thus at a time when most species were likely to be visible.

1.6 National Environmental Screening Tool

While the original assessment for this project was undertaken after the requirements for screening where published and implemented, the following section is included to confirm that no changes to the screening tool have come into effect since publication of the assessments.

The DEA Screening Tool (dated 12/12/2022) indicates the following:

- Terrestrial Biodiversity is Low (Figure 2).
- Plant species sensitivity is Medium (Figure 3).
- Animal Species sensitivity is High & Medium (Figure 4).
- Aquatic Sensitivity is Low & Very High (Figure 5)



Terrestrial Sensitivity	Feature(s) in proximity
Very High	ESA 2
High	None
Medium	None
Low	None
Plant Sensitivity	Feature(s) in proximity
Very High	None
High	None
Medium	Sensitive species 383, Peersia frithii & Tritonia florentiae
Low	Present
Animal Sensitivity	Feature(s) in proximity
Very High	None
High	Neotis ludwigii & Polemaetus bellicosus (birds)
Medium	Neotis ludwigii, Afrotis afra (birds) & Chersobius boulengeri (reptile)
Low	Present
Aquatic Sensitivity	Feature(s) in proximity
Very High	Strategic Water Source Area
High	None
Medium	None
Low	Present

NOTE: as per point 1.5 of the Terrestrial Biodiversity Specialist Assessment and Minimum Report Content Requirements:

'If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, **excluding linear activities** for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.'

Based on the above reporting protocol condition, the entire access roads and OHL grid connection components will fall into the above category, which implies that for a temporary linear activity, such as a pipeline or powerline, the screening tool designated high sensitivity should be reduced to a low sensitivity and only a complicated statement would be required.

The site walkdown has physically screened for the presence of any of the listed, and other possible species or sensitivities that are not identified in the screening tool over and above and above the findings of the original assessments. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

2 General Terrestrial Biodiversity

The site falls within a large basin between the Great Escarpment (Nuweveld Mountains) in the north and northwest and Cape Fold Belt Mountains (mostly Swartberg Mountains) in the south and typically consists of extremely irregular to slightly undulating low lying plains interspersed with hilly and mountainous ridges. The low-lying plains of the site consist of typical Eastern Upper Karoo which is a widespread vegetation type of low overall sensitivity. The slopes of the site are considered generally of moderate to high sensitivity on account of their high biodiversity value for fauna and flora as well as their vulnerability to disturbance and consequent erosion. The plateau areas consist of Upper Karoo Hardeveld elements, which is considered to be generally of moderate sensitivity. The plains and slopes are bisected by a somewhat complex network of seasonal drainage lines and watercourses, having Southern Karoo Riviere vegetation. All of the affected vegetation types are still generally intact, other than evidence of overgrazing and significant erosion in the valleys associated with deeper soils. No significant transformation is evident other than limited cultivated areas, in the valleys also associated with deeper soils.

The fauna of the area is considered to be composed of widespread species, with very few species of conservation concern likely to be present at the site. The most important areas for fauna at the site are the drainage systems and well-vegetated slopes which are largely outside of the development footprint and would not be significantly affected. The major impact on fauna would be habitat loss associated largely with the high-elevation plateau habitat of the site. As there are no species of high conservation concern prevalent in the area, impacts on terrestrial fauna were deemed likely to be relatively low and of local significance only.

2.1 Vegetation Units and Habitats

According to the national vegetation map, four vegetation types occur within the study area (

Figure 6); most of the wind farm site falls entirely within the <u>Gamka Karoo</u> vegetation type. Vegetation was confirmed by Todd (2022) to be as designated. Other units in the surrounding area include <u>Southern Karoo Riviere</u> in riverine areas and <u>Upper Karoo Hardeveld</u> on higher lying mountains plains. Elements of these units from the surrounding area may be present within the site in riverine areas and/or elevated areas respectively, which are not reflected on the scale of mapping based on the National Vegetation Map. These different units are briefly described below and then illustrated and characterised as they occur at the site.

Project : Koup WEF Layout - Vegetation and Status (National)



Figure 6: Regional Vegetation Units

As described by Todd (2022), Mucina & Rutherford (2006) designates the vegetation unit for the entire site as <u>Gamka Karoo</u> (Figure 6), with no other vegetation types for some distance from the site. Gamka Karoo occurs in the Western Cape and Eastern Cape Provinces and marginally into the Northern Cape Province. It occupies the large basin between the Great Escarpment (Nuweveld Mountains) in the north and northwest and Cape Fold Belt Mountains (mostly Swartberg Mountains) in the south. From approximately the edge of the Gamka basin catchment area (i.e. of the Dwyka River tributary) in the west to about the Kariega River in the east. The landscape typically consists of extremely irregular to slightly undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs with rare low trees (e.g. *Euclea undulata*). Geology is primarily mudstones and sandstones of the Beaufort Group (Adelaide Subgroup) with some Ecca (Fort Brown Formation) shales supporting very shallow and stony soils of the Glenrosa and/or Mispah forms. Mucina et al. (1996) list *Chasmatophyllum stanleyi, Hereroa incurva, Hoodia dregei, Ruschia beaufortensis. Jamesbrittenia tenuifolia, Manulea karrooica* and *Piaranthus comptus* as species endemic to this vegetation type. Gamka Karoo is classified as Least Concern (NBA, 2018) and less than 1% has been lost to

transformation. The Conservation status in the more recent NBA (2022) is still designated Least Concern, hence the status has not changed since the original assessment was undertaken.

Within the site and along the power line corridor, two basic communities can be recognised (Todd, 2022), the rocky hills and low ridges and then the plains of the site. The plains tend to be homogenous with few features of significance present and are dominated by low woody and succulent shrubs with occasional areas of calcrete or sandy soils where grasses are more abundant. The rocky hills are more heterogenous and have a higher abundance of larger woody species than the plains and may also contain localised communities of low succulents. In general, the rocky hills are considered more sensitive than the surrounding plains as the diversity of the hills is usually higher than the plains.

Within the site, the areas of <u>Gamka Karoo plains</u> (Table 1) are dominated by Pentzia incana, Hirpicium alienatum, Ruschia beaufortensis, Lycium cinereum, Stipagrostis ciliata, Stipagrostis obtusa, Aristida congesta, Thesium lineatum, Enneapogon desvauxii, Asparagus capensis, Asparagus glauca, Fingerhuthia africana, Euphorbia mauritanica, Limeum aethiopicum and Aloe claviflora.





Table 1: Gamka Karoo (NKl 1).

GROWTH FORM	DESCRIPTION/SPECIES
Geophytic Herbs	Drimia intricata, Moraea polystachya.
Grasses	Aristida congesta (d), A. diffusa (d), Fingerhuthia africana (d), Stipagrostis ciliata (d), S. obtusa (d), Aristida adscensionis, Cenchrus ciliaris, Digitaria argyrograpta, Enneapogon desvauxii, Enneapogon scaber, Eragrostis homomalla, E. lehmanniana, E. obtusa, Tragus
	berteronianus, T. koelerioides.
Herbs	Gazania lichtensteinii (d), Chamaesyce inaequilatera, Dicoma capensis, Galenia glandulifera, Lepidium africanum subsp. africanum, L. desertorum, Lessertia pauciflora var. pauciflora, Leysera tenella, Osteospermum microphyllum, Sesamum capense, Tetragonia microptera, Tribulus terrestris, Ursinia nana.
Tall Shrubs	Lycium cinereum (d), L. oxycarpum (d), Rhigozum obovatum (d), Acacia karroo, Cadaba aphylla, Lycium schizocalyx, Rhus burchellii, Sisyndite spartea.
Low shrubs	Chrysocoma ciliata (d), Eriocephalus ericoides subsp. ericoides (d), E. spinescens (d), Felicia muricata (d), Galenia fruticosa (d), Limeum aethiopicum (d), Pentzia incana (d), Pteronia adenocarpa (d), Rosenia humilis (d), Aptosimum indivisum, Asparagus burchellii, Blepharis mitrata, Eriocephalus microphyllus var. pubescens, Felicia filifolia subsp. filifolia, F. muricata subsp. cinerascens, Galenia secunda, Garuleum bipinnatum, G. latifolium, Gomphocarpus filiformis, Helichrysum lucilioides, Hermannia desertorum, H. grandiflora, H. spinosa, Melolobium candicans, Microloma armatum, Monechma spartioides, Pentzia pinnatisecta, Plinthus karooicus, Polygala seminuda, Pteronia glauca, P. sordida, P. viscosa, Selago geniculata, Sericocoma avolans, Zygophyllum microcarpum, Z. microphyllum.
Succulent Shrubs	Ruschia intricata (d), Aridaria noctiflora subsp. straminea, Crassula muscosa, Drosanthemum lique, Galenia sarcophylla, Kleinia longiflora, Ruschia spinosa, Salsola tuberculata, Sarcocaulon patersonii, Trichodiadema barbatum, Tripteris sinuata var. linearis.
Semiparasitic Shrub	Thesium lineatum
Biogeographically Important Taxa	(*Endemic to Great Karoo Basin)

¹ (d) Dominant

GROWTH FORM	DESCRIPTION/SPECIES ¹
	<u>Succulent Shrubs</u> : Hereroa latipetala* (also found in Prince Albert Succulent Karoo), Hereroa odorata* (also found in Koedoesberge-Moordenaars Karoo), Pleiospilos compactus (southern and western limits of distribution), Rhinephyllum luteum*, Stapelia engleriana*. <u>Geophytic Herb</u> : Tritonia tugwelliae*.
	Succulent Herbs: Piaranthus comptus*. Tridentea parvipuncta subsp. parvipuncta*.
	Graminoid: Oropetium capense (westernmost limit of distribution).
	Succulent Shrubs: Chasmatophyllum stanleyi, Hereroa incurva, Hoodia dregei, Ruschia
	beaufortensis.
Endemic Taxa	Low Shrubs: Jamesbrittenia tenuifolia.
	<u>Herb</u> : Manulea karrooica.
	Succulent Herb: Piaranthus comptus.

Upper Karoo Hardeveld elements (Table 2) are present on the <u>Gamka Karoo stony hills</u>, which have common and dominant species including *Carissa haematocarpa*, Euclea undulata, Nenax microphylla, Thesium lineatum, Tragus koelerioides, Hermannia cuneifolia, Hermannia desertorum, Eriocephalus microcephalus, Searsia burchellii, Hirpicium alienatum, Galenia fruticosa, Pteronia glomerata, Dianthus namaquensis, Rhigozum obovatum, Helichrysum zeyheri, Cissampelos capensis, Pegolettia retrofracta, Garuleum bipinnatum, Kleinia longiflora, Cotyledon orbiculata, Enneapogon scaber, Asparagus striatus, Astroloba corrugata and Pteronia incana.



Trees and taller shrubs are not common in the open veld but are usually prevalent around the rocky outcrops which occur scattered across the plateau areas as well as near drainage lines and watercourses, with species such as *Euclea undulata*, *Lycium cinereum*, *Acacia karroo and Rhus burchellii*. The abundance of Species of Conservation Concern (SCC) within this habitat is relatively low and no species of high conservation concern were observed, including Sensitive Species 383. Some provincially protected species are however present including *Aloe claviflora*. Rockier areas tend to have elements of <u>Upper Karoo Hardeveld</u>, as described below. A general list of species that are represented in the vegetation type and conservation status characteristics is provided in Table 1.

GROWTH FORM	DESCRIPTION/SPECIES ²
Geophytic Herbs	Albuca setosa, Androcymbium albomarginatum, Asplenium cordatum, Boophone disticha, Cheilanthes bergiana, Drimia intricata, Oxalis depressa
Grasses	Aristida adscensionis (d), A. congesta (d), A. diffusa (d), Cenchrus ciliaris (d), Enneapogon desvauxii (d), Eragrostis lehmanniana (d), E. obtusa (d), Sporobolus fimbriatus (d), Stipagrostis obtusa (d), Cynodon incompletus, Digitaria eriantha, Ehrharta calycina, Enneapogon scaber, E. scoparius, Eragrostis curvula, E. nindensis, E. procumbens, Fingerhuthia africana, Heteropogon contortus, Merxmuellera disticha, Stipagrostis ciliata, Themeda triandra, Tragus berteronianus, T. koelerioides
Herbs	Troglophyton capillaceum subsp. capillaceum, Dianthus caespitosus subsp. caespitosus, Gazania krebsiana, Lepidium africanum subsp. africanum, Leysera tenella, Pelargonium minimum, Sutera pinnatifida, Tribulus terrestris.
Tall Shrubs	Lycium cinereum (d), Rhigozum obovatum (d), Cadaba aphylla, Diospyros austro- africana, Ehretia rigida subsp. rigida, Lycium oxycarpum, Melianthus comosus, Rhus burchellii.
Low shrubs	Chrysocoma ciliata (d), Eriocephalus ericoides subsp. ericoides (d), Euryops lateriflorus (d), Felicia muricata (d), Limeum aethiopicum (d), Pteronia glauca (d), Amphiglossa triflora, Aptosimum elongatum, A. spinescens, Asparagus mucronatus, A. retrofractus, A. striatus, A. suaveolens, Eriocephalus spinescens, Euryops annae, E. candollei, E. empetrifolium, E. nodosus, Felicia filifolia subsp. filifolia, Garuleum latifolium, Helichrysum lucilioides, H. zeyheri, Hermannia filifolia var. filifolia, H. multiflora, H. pulchella, H. vestita, Indigofera sessilifolia, Jamesbrittenia atropurpurea, Lessertia frutescens, Melolobium candicans, M. microphyllum, Microloma armatum, Monechma incanum, Nenax microphylla, Pegolettia retrofracta, Pelargonium abrotanifolium, P. ramosissimum, Pentzia globosa, P. spinescens, Plinthus karooicus, Polygala seminuda, Pteronia adenocarpa, P. sordida, Rosenia humilis, Selago albida, Solanum capense, Sutera halimifolia, Tetragonia arbuscula, Wahlenbergia tenella.
Succulent Shrubs	Aloe broomii, Drosanthemum lique, Faucaria bosscheana, Kleinia longiflora, Pachypodium succulentum, Trichodiadema barbatum, Zygophyllum flexuosum.
Semiparasitic Shrub	Thesium lineatum (d).
Endemic Taxa	Succulent Shrubs: Aloe chlorantha, Crassula barbata subsp. broomii, Delosperma robustum, Sceletium expansum, Stomatium suaveolens. Low Shrubs: Cineraria polycephala, Euryops petraeus, Lotononis azureoides, Selago magnakarooica. Tall Shrub: Anisodontea malvastroides. Herbs: Cineraria arctotidea, Vellereophyton niveum. Succulent Herbs: Adromischus fallax, A. humilis. Geophytic Herbs: Gethyllis longistyla, Lachenalia aurioliae, Ornithogalum paucifolium subsp. karooparkense.

Table 2: Upper Karoo Hardeveld (NKI 2).

² (d) Dominant



Although the National Vegetation Map depicts maps only Gamka Karoo in the area, the larger drainage systems of the site with well- developed woody vegetation have Southern Karoo Riviere vegetation elements (Table 3). The Southern Karoo Riviere vegetation type is associated with the rivers of the central karoo such as the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega and Sundays Rivers. About 12% has been transformed as a result of intensive agriculture and the construction of dams. Although it is classified as Least Threatened, it is associated with rivers and drainage lines and as such represents areas that are considered ecologically significant. Typical and dominant species observed from the drainage lines of the site includes *Vachellia karroo, Salsola aphylla, Lycium prunus-spinosa, Atriplex vestita, Zygophyllum retrofractum, Stipagrostis namaquensis, Lycium pumilum, Lycium cinereum, Artemisia africana* and *Deverra denudata*. These areas are generally considered sensitive due to the ecological role that riparian areas and drainage systems play. Although the site falls within the broader range of the Riverine Rabbit, the riparian habitat is sparse and stony with little habitat present that would suggest that the habitat within the site is suitable for this species.

Typical larger drainage line from within the site comprise Vachellia karroo dominating the banks and common and dominant species in the drainage lines and within the adjacent floodplain vegetation include Sporobolus ioclados, Drosanthemum lique, Salsola aphylla, Tribulus terrestris, Felicia muricata, Atriplex vestita, Zygophyllum retrofractum, Cynodon dactylon, Stipagrostis namaquensis, Lycium pumilum, Lycium cinereum, Artemisia africana, Tripteris spinescens and Exomis microphylla.

GROWTH FORM	DESCRIPTION/SPECIES ³
	Riparian thickets <u>Small Trees</u> : Acacia karroo (d), Rhus Iancea (d).
Important Taxa	<u>Tall Shrubs</u> : Diospyros lycioides (d), Tamarix usneoides (d), Cadaba aphylla, Euclea undulata, Grewia robusta, Gymnosporia buxifolia, Melianthus comosus. Low Shrub: Asparagus striatus.

Table 3: Southern Karoo Riviere (AZi 6).

3 (d) Dominant

GROWTH FORM	DESCRIPTION/SPECIES ³
	Succulent Shrubs: Lycium cinereum (d), Amphiglossa callunoides, Lycium hirsutum, L.
	oxycarpum.
	Rocky slopes of river canals
	<u>Graminoid</u> : Stipagrostis namaquensis (d).
	Alluvial shrublands & herblands
	Low Shrubs: Ballota africana, Bassia salsoloides, Carissa haematocarpa, Pentzia incana.
	Succulent Shrubs: Malephora uitenhagensis (d), Salsola aphylla (d), S. arborea (d),
	Drosanthemum lique, Salsola geminiflora, S. gemmifera.
	Graminoids: Cynodon incompletus (d), Cenchrus ciliaris, Cyperus marginatus.
	Reed beds
	<u>Megagraminoid</u> : Phragmites australis (d).
Endomic Taxa	Alluvial shrublands & herblands
Engennic Taxa	Graminoid: Isolepis expallescens.

2.2 Protected Flora

There is a relatively low number of Species of Conservation Concern (SCC) known from the area (Appendix 1) but given the low number of records it is expected that there would be additional species present as well. Listed and protected species are sometimes confined to specific habitats such as wetlands and rock pavements, outcrops or gravel patches.

Refer to Section 3.2 Flora.

2.3 Faunal Habitat and Communities

Observations made during the walkdown supplemented by previous ecological and biodiversity assessments undertaken by Todd (2022) identify the following faunal attributes:

2.3.1 Mammals

The study area and broad surroundings have not been well-sampled historically for mammals, with the result that the records from the existing databases do not provide a comprehensive picture of the mammalian community of the area. In order to counter this problem, the lists of mammals were extracted for a considerably larger area including the two quarter degree squares north of the site, which are considered to be those most similar to the site. Based on this larger sample area, the mammalian community is estimated at approximately 30 species. Common species observed at the site or on nearby sites that have been previously sampled, include Cape Porcupine, Steenbok, Greater Kudu, Vervet Monkey, Chacma Baboon, Cape Hare, Bat-eared Fox, Cape Fox, Black-backed Jackal, Aardwolf, Caracal, Common Duiker, Yellow Mongoose, Cape Grey Mongoose, Striped Polecat, Common Genet, Meerkat, Aardvark and Ground Squirrel. This represents a typical mammalian community for the Koup area and the lower Nama Karoo in general.

The only mammal species of conservation concern that may be present on the site is the Riverine Rabbit (*Bunolagus monticularis*) which is listed as <u>Critically Endangered</u>. The field assessment of the site indicated that there is minimal suitable habitat for the Riverine Rabbit present within the Koup site. The drainage lines within the Koup site are gravelly or stony in nature with very little floodplain vegetation and a general lack of silty banks with dense vegetation that provide the usual suitable habitat for this species. Specific camera trapping for Riverine Rabbit on the adjacent Beaufort West and Trakas wind farms, which has more suitable habitat than the Koup site did not pick any Riverine

Rabbits indicating that this species is very unlikely to be present. In addition, the EWT Riverine Rabbit records database indicates that there have not been any historical sightings from the site or immediate surrounds. As such, the site is considered low sensitivity for this species and an impact on this species is not expected to occur.

In general, impacts on mammals would occur due to disturbance and habitat loss. During the construction phase there would be significant disturbance at the site due to construction-related activities. During operation, there would be some disturbance at the wind farm due to noise generated by the wind turbines and some disturbance related to more general operational activities. The long-term habitat loss related to the development is estimated at 50 ha, which in context of the surrounding landscape is considered relatively minor. More mobile or disturbance-sensitive species are likely to be displaced during construction but would likely move back into the affected areas once the facility is operational. Many species are likely to become at least partly habituated to the presence and operation of the wind turbines. In general, the major long-term impacts of the development would be about 50 ha of direct habitat loss for the resident mammals and some disturbance associated with noise and human activity associated with turbine construction and operation, which would have a greater extent, dependent on the specific response of the affected species.

A potential but little-known impact may occur as a result of the noise and infra-sound generated by the wind turbines. A major source of background infrasound in the natural environment is wind-generated, with the result that increasing levels of infrasound generated by wind turbines occur simultaneously with increasing levels of natural background noise as the wind speed increases. The contribution of wind turbines to infrasound appears to become undetectable from background levels, even in rural environments within 1.5 km of wind farms (Evans et al. 2013). Apart from the infrasound, audible noise generated by the turbines may have a negative impact on noise-sensitive species. Although this impact has not been well-documented and warrants investigation, it is plausible that species that use sound for prey detection or predator avoidance may be negatively affected by the noise generated by the wind turbines. There are however no species of high conservation concern that are likely to be affected by noise at the site, so this impact is likely to be of limited extent and restricted to a subset of the fauna present. In addition, studies of noise impacts on fauna have demonstrated that many faunal species are able to use various behavioural adaptations to reduce the impact of noise on their activities.

2.3.2 Reptiles

Reptile diversity in the Koup area is expected to be moderate to low, which can be ascribed to the relative homogeneity of the habitats present and the lack of moist, well-vegetated environments or significant escarpment and cliff habitats. Based on the ReptileMap database, approximately 25 species are known from the area. The only species of potential concern known from the area is the Karoo Padloper or Karoo Dwarf tortoise, *Chersobius boulengeri* (Endangered). This small tortoise is seldom observed, even when specifically targeted during herpetofauna surveys as it is usually active for less than 15 minutes a day (or largely entirely inactive during cold or dry conditions). They are associated with dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes. Threats to this species include habitat degradation due to agricultural activities and overgrazing, and predation by the Pied Crows which in recent decades have expanded in distribution range. The habitat on site is considered broadly unsuitable for the Karoo Padloper, but within some localised koppies and outcrops with sufficient rock cover to provide the shelter that this species requires. The development would however largely avoid the rocky shelter sites of this species with the result that direct habitat loss would be low. In addition, tortoises are one of the few species that have been specifically studied with regards to their responses to wind energy development and no significant negative impacts have been

detected within population's resident on wind farms (Agha et al. 2015, Lovich et al. 2011). There is potential concern that the development could result in tortoises, including the Karoo Padloper being run over by vehicles on the site. While this is a potential concern during construction due to the large number of vehicles present, during operation, this impact would be low and restricted to maintenance activities. Although tortoises could be kept off the wind farm roads by fencing or similar structures, this is not recommended as this would also function to limit tortoise movement across the landscape. In addition, the vegetation cover on the site is already very low and the reptile species present are species adapted to low-cover conditions with the result that the open areas created by the roads of the site would be represent significant obstacles for the species present.

In general, the major impacts on reptiles associated with the development would be disturbance and habitat loss during construction. However, there do not appear to be any species that would be especially affected.

The most important areas for reptiles are likely to be the occasional steeper rocky outcrops and the larger drainage lines with some woody vegetation which offer some cover for those species less able to deal with the low vegetation cover of most of the site. The footprint within these areas would be low and as such there do not appear to be any significant limitations or red-flag issues associated with reptiles and the development of the wind farm.

2.3.3 Amphibians

The diversity of amphibians in the study area is relatively low with only six species having being recorded in the area. Species observed at the site include the Karoo Toad and Poynton's River Frog. There are no listed amphibian species known from the area although the Giant Bull Frog *Pyxicephalus adspersus* was previously listed as Near Threatened but has revised to Least Concern. This species is associated with temporary pans in the Karoo, Grassland and Savannah Biomes, but is not commonly recorded in the study area and its presence at the site is considered unlikely as there is no suitable breeding habitat present within the site. Although there is no permanent water within the site, there are a few larger drainage lines present or small earth dams that would have temporary pools that can be used by toads and frogs for seasonal breeding purposes. The impact of the development on these breeding sites would be very low and a direct impact on these habitats is unlikely. Given the localised nature of important amphibian habitats at the site as well as the generally arid nature of the site and the low overall abundance of amphibians, a significant long-term impact on amphibians is unlikely.

2.3.4 Invertebrates

No invertebrate investigations have been undertaken and no invertebrates of conservation concern identified. It is probable that Baboon Spiders and Scorpions are present, both being ToPS protected and thus requiring permits during search and rescue.

2.4 Bioregional Planning

The Western Cape Biodiversity Spatial Plan (WC BSP, 2017) map is depicted below for the study area (Figure 7). This biodiversity assessment identifies CBAs which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to maintain ecosystem functioning and meet national biodiversity objectives. The only designated CBA is on the eastern side, to the east of the overhead powerline, where no turbines are situated.



Figure 7: Bioregional Planning (Critical Biodiversity Areas).

2.5 Site Sensitivity Assessment

An ecological sensitivity map of the site was produced by integrating the results of the site visits with the available ecological and biodiversity information in the literature and various spatial databases by Todd (2022), Figure 8. This walkdown process will verify these findings and assess the layout in more depth in order to recommend any minor modifications than should or can be made to reduce the impact further. In general, the initial biodiversity assessment for the EIA phase tends to focus on the broader site, rather than fine scale layout planning and assessment, which usually get refined and addressed at this walkdown stage. The original sensitivity map and walkdown layout are indicated in Figure 9.

As per Todd (2022), sensitive features such as wetlands, drainage lines, rocky hills and steep slopes were mapped and buffered where appropriate to comply with legislative requirements or ecological considerations. Additional sensitive areas were then identified and delineated based on the results of the field assessment and satellite imagery of the site. All the different layers created were then merged to create a single coverage. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the scale as indicated below.

- Low Areas of natural or transformed habitat with a low sensitivity where there is likely to be a
 negligible impact on ecological processes and terrestrial biodiversity. Most types of development
 can proceed within these areas with little ecological impact.
- **Medium** Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk

of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.

- High Areas of natural or transformed land where a high potential impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is less desirable and should proceed with caution (such as specific consideration of the footprint within these areas and field verification of the acceptability of development within these potentially sensitive areas) as it may not be possible to mitigate all impacts appropriately.
- Very High Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible.

The sensitivity map for the Koup 2 WEF area is depicted below in Figure 9. Overall, Todd considered the site to be generally favourable for development of the wind farm, which is confirmed. Although there are some areas which should be excluded from development or in which the development footprint should be constrained, there are large tracts of the site that are considered low sensitivity and where development would have a low impact. The mapped no-go and high sensitivity areas have been used to inform the development layout as described in Todd (2022, Table 5). The main feature comprise the very high sensitivity areas considered unsuitable for the placement of turbines, buildings and substations (and associated battery facility) within the site are the major drainage systems. There are also numerous steep slopes present which are considered high sensitivity and which are considered unsuitable for buildings, substations and temporary lay-down areas. These slopes are however considered acceptable for the placement of some turbines and associated access roads subject to the stated limits of acceptable change. Todd (2022) noted that the footprint within the low, medium and high sensitivity areas is well within the limits of acceptable change and that the limit of acceptable change for the Very High sensitivity category is marginally exceeded. However, before this result is discussed in more detail, it is important to note that this does not imply an immediate fatal flaw for the project, as the specific context, the features affected and overall site sensitivity need to be evaluated at the same time to establish the degree and nature of conflict and the presence of options to mitigate or avoid impacts to these areas. Within the very high sensitivity areas, the footprint is marginally higher at 1.15ha than the tolerance of 0.87 ha, however, the difference of 0.25ha is not considered significant for the current site and would occur at drainage crossings and the acceptability of these would be specifically dealt with in the freshwater study. From an ecological perspective, the footprint within the Very High sensitivity areas is considered acceptable given that this would be restricted to river crossings of the wind farm access roads, the potential to mitigate impacts on these features is high and a long-term negative impact on biodiversity within these areas is low.



Figure 8: Original assessment site vegetation sensitivity (Todd, 2022).

2 Kilometers

Ecological Sensitivity

Very High High

Medium

Low

0

2

.

Grid Options

Koup 1 WEF Area

Koup 2 WEF Area

Koup 2 Turbines

Turbine Access Roads

Laydown Area Option 2

Power Line Corridor Option 1

Substation Option 2

Koup 2 WEF

Ecological Sensitivity

3Foxes Biodiversity Solutions

Produced for SiVEST

April 2022

16/05/2023

Project : Koup WEF

Layout - Vegetation Sensitivity



Figure 9: Site Vegetation and Sensitivity overlain on original mapped sensitivity (as per Todd, 2022). Revised positions indicated in blue.

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 2 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 2 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. Although there are no CBAs within the site, the smaller drainage features of the site are classified as Ecological Support Areas and it would not be possible to avoid some impact on these features. However, with the appropriate mitigation, the development would not compromise the functioning of the affected ESAs. In terms of cumulative impacts, the wider area currently has a low development impact from renewable energy and the contribution of the Koup 2 WEF to cumulative impact at less than 50ha is considered relatively low and would not generate significant broad-scale impact. The contribution of the grid connection to cumulative impact would be low and considered acceptable.

The fauna of the area is composed of widespread species, with very few species of conservation concern likely to be present in the area. The most important areas for fauna at the site are the drainage systems and the well-vegetated slopes which are largely outside of the development footprint and would not be significantly affected. The rocky outcrops on the plateau were however observed to have a high abundance of reptiles, which relates to the weathering patterns of the mudstones and the resultant abundance of refugia. The major impact on fauna would be habitat loss associated largely with the high-elevation plateau habitat of the site.

The walkdown findings concur broadly with the original assessment. Final micro-siting has led to recommendation relating to several components, locally and based on the recommendation made during the walkdown, several suggestions have been provided that will reduce the loss of very high sensitivity areas, which was indicated by Todd to marginally exceed acceptable limits.

3 Walkdown Findings

3.1 Vegetation

Since the original ecological assessments were undertaken for each of the separate wind energy facility projects, this walkdown has been undertaken for the wider project area and thus it has been possible to refine and better understand the vegetation composition and local distribution of flagged species of conservation concern within the greater area of influence.

3.2 Flora Species of Conservation Concern

Several Species of Conservation Concern were identified during the initial ecological assessments. In addition, with the inclusion of additional available information, observations and surveying during the walkdown, several additional species have been identified. These will be added to the species list for the respective permit applications. A list of flora species of conservation concern that have been identified or recorded previously or during the walkdown is provided in Table 4 below. In general, the

species are widespread and are not associated with any specific turbine or WEF infrastructure component. Several geophytic species are also likely to be present but were not recorded during the initial assessment and were not visible during the walkdown, as the season was not favourable. Respective permits will be required before commencement of flora relocation.

Table 4: Status of flora species of conservation concern confirmed to be present as per Todd (2022) with additional
walkdown observations.

SCIENTIFIC NAME	FAMILY	STATUS ⁴	DESCRIPTION AND DISTRIBUTION
Adromischus fallax	Crassulaceae	Rare	NOT RECORDED. Suitable habitat not present. A rare, range-restricted habitat specialist (extent of occurrence 8 km ²) that is not threatened. Known currently from only two subpopulations but likely to occur at a few more.
Aloe chlorantha	Asphodelaceae	Neat Threatened	PRESENT but uncommon. Aloe chlorantha is a rare species, occurring in small, scattered subpopulations. Field observations in the 1980s of a subpopulation near Fraserburg recorded around 25 plants (H.F. Glen pers. comm. 1986), but no recent field data on the population size is available. The species is currently known from seven locations, but it is likely more common as its habitat is botanically very poorly explored.
Anisodontea malvastroides	Malvaceae	Rare.	NOT RECORDED. This species is endemic to the mountains of the Great Karoo, where it occurs in the Nuweveld and Sneeuberg mountains between Beaufort West and Middelburg.
Gethyllis longistyla	Amaryllidaceae	Rare	NOT RECORDED. May be seasonally present, but unconfirmed at times of sampling. A relatively widespread, but rare species, typically occurring in small subpopulations. It is not currently threatened. Gethyllis longistyla is known from only a few records, scattered over a wide area. It is rare, and easily overlooked, as it is cryptic when it is not flowering, and flowers, which appear in late summer, lasts only a few days. Subpopulations are typically small, occurring in subpopulations consisting of 20 or fewer plants.
Lotononis azureoides	Fabaceae	Rare	NOT RECORDED. Suitable habitat not present. A range- restricted species with an extent of occurrence (EOO) of 144 km ² and is known from four subpopulations. It has no significant threats and is therefore not in danger of extinction.
Peersia frithii	Aizoaceae	NEST (M), Vulnerable	PRESENT, locally common on poorly vegetated rocky shale gravel areas. A species previously collected widely throughout the southern of the Karoo with an historic extent of occurrence (EOO) of 28913 km ² . It has only been recorded seven times since 1990 and is suspected to be extant at 6 locations from a current EOO of 690 km ² . Decline is suspected to be the result of livestock overgrazing and trampling. No historical records near the site but it does fall within east-west distribution range.
Ruschia beaufortensis	Aizoaceae	Vulnerable	NOT RECORDED, may be present in elevated areas but unlikely. A poorly known species recorded only from the

⁴ NC - Northern Cape Nature Conservation Act (Act no. 9 of 2009), Schedule 1 or 2; EC – Provincial Nature Conservation Ordinance (No. 19 of 1974).; TOPS – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (LC), Near Threatened (NT), Critically Endangered (CR), Endangered (EN), Vulnerable (VU); CITIES - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	FAMILY	STATUS ⁴	DESCRIPTION AND DISTRIBUTION
			arid mountains near Beaufort West (extent of occurrence 476 km ²). Between two and five locations exist, subpopulations occurring outside of the park are potentially threatened by uranium mining. Site is not within typical habitat but does not exclude possible presence without further investigation.
Sensitive Species 1039	Apocynaceae		PRESENT, Uncommon and localised, more prevalent on Koup 2 site to the east. This taxon occurs in the southern Great Karoo from Aberdeen and Graaff-Reinet southwards to Rietbron and eastwards to Willowmore, Klipplaat and Steytlerville. This taxon is rare, occurring as widely scattered individuals. There are often several hundred meters between plants, one subpopulation east of Willowmore was found to include more than 50 large plants (Bruyns 2005).
Sensitive species 1212	Aizoaceae	Vulnerable	NOT RECORDED. Suitable habitat not abundant within the site. Several marginally suitable areas were surveyed and none were found. EOO <7 000 km ² , known from fewer than 10 locations and habitat quality and number of mature individuals are declining as a result of livestock (sheep and goat) overgrazing and illegal collection for the succulent plant trade. Potentially threatened at some locations by prospecting for uranium mining. Site is outside of known occurrence range but does not exclude possible presence without further investigation.
Sensitive species 383	Euphorbiaceae	NEST (M), Vulnerable	PRESENT. Ongoing degradation of this species' habitat as a result of livestock overgrazing and the increased intensity and duration of droughts. This species is known from only a few records, from five locations, but it is likely to be more common as it is easily overlooked when it grows sheltered under larger shrubs, and its range is botanically poorly explored.
Tridentea virescens	Apocynaceae	Rare	NOT RECORDED. May be seasonally present, but unconfirmed at times of sampling. A widespread species that occurs as sporadic small subpopulations of up to six plants. No threats are known to impact this species.
Tritonia florentiae	Iridaceae	NEST (M), Vulnerable	NOT RECORDED. May be seasonally present, but unconfirmed at times of sampling. Ongoing degradation of this species' habitat as a result of livestock overgrazing and the increased intensity and duration of droughts. This species is known from only a few records, from five locations, but it is likely to be more common as it is easily overlooked when it grows sheltered under larger shrubs, and its range is botanically poorly explored.

3.3 Fauna Species of Conservation Concern

Fauna species of Conservation Concern typical of the vegetation and site include species listed in Table 5, as per Todd (2016, 2017, 2019) with additional walkdown observations. Respective permits will be required before commencement of fauna relocation. Refer to original assessments Todd (2022) for <u>full list of faunal species</u>.

Table 5: Listed faun	a species of conserva	tion concern confir	med to be present as per Todd (2022).
SCIENTIFIC NAME	COMMON NAME	STATUS ⁵	OCCURRENCE/COMMENT
MAMMALS			
Bunolagus monticularis	Riverine Rabbit	NEST (M), EN	The Riverine Rabbit is endemic to the semi-arid central Karoo region of South Africa (estimated extent of occurrence (EOO) is 54,227 km ² and area of occupancy (AOO) is 2,943 km ²). Marginally suitable habitat present but limited to main lower order watercourses. Likely to require specialist confirmation.
Felis nigripes	Black-footed cat	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub. May a be transient species, but not recorded.
BIRDS			-
Neotis ludwigii	Ludwig's Bustard	NEST (H), EN (SA), EN (Intl)	Refer to Avifaunal reporting.
Polemaetus bellicosus	Martial Eagle	NEST (M), EN (SA), VU (Intl)	Refer to Avifaunal reporting.
Afrotis afra	Southern Black Korhaan	NEST (M), VU (SA), VU (Intl)	Refer to Avifaunal reporting.
Aquila verreauxii			Refer to Avifaunal reporting.
REPTILES			1
Psammobates tentorius subsp tentorius	Karoo Tent Tortoise	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads. Found throughout the project area but observed to be more common in lowland areas.
Psammobates tentorius veroxii	Bushmanland Tent Tortoise	NT	Tortoises are highly susceptible to collisions with motor vehicles and trucks on new roads. Found throughout the project area but observed to be more common in lowland areas.
Homopus femoralis	Greater Padloper	LC	Found throughout the project area but observed to be more common in lowland areas.
Stigmochelys pardalis	Leopard Tortoise	LC	Found throughout the project area. Common along roads.
Chersobius boulengeri	Karoo padloper or Karoo Dwarf Tortoise	EN	Not recorded in original assessment but possibly present.
AMPHIBIANS			
None			
INVERTEBRATES			
Scorpions		ToPS	Not confirmed during original assessment, but several species

⁵NC - Northern Cape Nature Conservation Act (Act no. 9 of 2009), Schedule 1 or 2; EC – Provincial Nature Conservation Ordinance (No. 19 of 1974).; ToPS – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (LC), Near Threatened (NT), Critically Endangered (CR), Endangered (EN), Vulnerable (VU); CITIES - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	COMMON NAME	STATUS⁵	OCCURRENCE/COMMENT
			present. Include in permit
			applications.
			Likely present, not confirmed
Baboon Spiders		ToPS	during original assessment. Include
			in permit applications.

3.4 Sensitive Areas and Species Populations

Sensitive areas identified either in the original biodiversity assessment and/or observed during the walkdown include the following:

- Rocky Outcrops and Ridges on slopes and mountain peaks outcrops generally have a greater density of succulent species (Aizoaceae and Crassulaceae) that will require relocation.
- Rivers, seeps, watercourses, wetlands and pans minimise impacts to aquatic processes.
- Sub-populations of flagged species of conservation concern often associated with rocky areas.
- Slope and mountain edges excessive cut and fill will elevate impact.

3.5 Turbines, Roads and other Infrastructure

A summary analysis of specific infrastructure risks is provided in Table 6 and indicated in Figure 10.

Project : Koup WEF



Figure 10: Analysis of turbine positions and other WEF infrastructure (Koup 1 – red, Koup 2 - yellow).

Compiled by: Jamie Pote (Pr. Sci. Nat.)

Terrestrial Biodiversity Walkdown Report: Koup 2 Wind Energy Facility

16/05/2023

Table 6: Summary of WEF and infrastructure vegetation and sensitivities and recommended layout adjustments.

TURBINE	HABITAT ⁶	COMMENT
WTG 29	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and several watercourse crossings, no adjustments recommended .
WTG 30	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 31	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 32	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 33	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland with several watercourse crossings Road meanders over drainage line unnecessarily and turbine is on slope near minor drainage lien. Recommend slight southward shift of turbine
	Pocky chrubland	Turbing in rocky chrybland on hillslong, road through chrybland, no adjustments recommended
VIG 34		Turbine in rocky shi ubland on hillslope, road through shi ubland and several watercourse crossings. Dead terminates and
WTG 35	Rocky shrubland	turbine overlaps with drainage line source. Recommend slight shift to west.
WTG 36	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 37	Rocky shrubland	Turbine in rocky shrubland on small plateaux, road through shrubland, no adjustments recommended.
WTG 38	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 39	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 40	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 41	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 42	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and watercourse, no adjustments recommended.
WTG 43	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 44	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and watercourse, Road intersection falls over watercourse. Recommend road shift.
WTG 45	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and watercourse, no adjustments recommended .
WTG 46	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 47	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 48	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 49	Rocky shrubland	Turbine close to watercourse and surrounding riparian/vlei like area. Recommended shift to east or west.
WTG 50	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 51	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and watercourse, no adjustments recommended.
WTG 52	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and watercourse, no adjustments recommended.
WTG 53	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and minor watercourse, no adjustments recommended.
WTG 54	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 55	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland and minor watercourse, no adjustments recommended.

⁶ Rocky habitat generally more likely to have more species of conservation concern for relocation as well as reptiles (snakes and lizards).

Terrestrial Biodiversity Walkdown Report: Koup 2 Wind Energy Facility

TURBINE	HABITAT ⁶	COMMENT
WTG 56	Rocky shrubland	Turbine in rocky shrubland on hillslope, very near watercourse. Road through shrubland, Laydown area to be in northerly direction.
WTG 57	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
с	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 59	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
WTG 60	Rocky shrubland	Turbine in rocky shrubland on hillslope, road through shrubland, no adjustments recommended.
BESS	Sandy Grassland	Substation in rocky shrubland on slightly elevated area, no adjustments recommended.
Laydown Area	Sandy Grassland	Substation in rocky shrubland on slightly elevated area, no adjustments recommended.
ОМ	Sandy Grassland	Substation in rocky shrubland on slightly elevated area, no adjustments recommended.
Substation	Rocky Shrubland	Substation in rocky shrubland on slightly elevated area, no adjustments recommended.
Grid Option 1 (East)	Rocky/ Grassland/ Shrubland	Traverses rocky shrubland and sandy grassland and section along watercourse, follows existing access road (north side). Several adjustments recommended in order to avoid watercourse and riparian vegetation with tall trees that will likely require removal along servitude where OHL follows major watercourse. Recommend shifting OHL southwards away from river entirely.
Main Koup 2 Access Road	Rocky Shrubland & Sandy Grassland	Main access road follows existing gravel access road and traverses numerous watercourses, to be upgraded accordingly to minimise erosion risk. North-western end of main access road (towards turbines 30 to 38) crosses a major watercourse at point of high ledge on western bank. Alternatives would be recommended if feasible, as significant cut and fill and/or a large bridge structure would likely be required.

Table 7: Recommended layout adjustment maps and photos.



Terrestrial Biodiversity Walkdown Report: Koup 2 Wind Energy Facility



Terrestrial Biodiversity Walkdown Report: Koup 2 Wind Energy Facility





4 Walkdown Conclusions and Recommendations

The following general recommendations are made based on the findings of the walkdown, with reference to Table 6 & Table 7 and Figure 10:

- No turbine positions were noted to conflict with any sensitive areas <u>as per original assessment</u>.
- Site walkdown determined that several turbines and roads were on or near sensitive features, including several drainage lines, watercourses and grassy veli like areas. While not directly of a terrestrial nature these features do none the less have potential indirect terrestrial habitat sensitivities, being in an arid environment where the aquatic and terrestrial environment are closely linked. Several minor alignment recommendations have been made in this regard. These will also reduce the very high sensitivity footprint slightly.
- Other potential issues that were identified in the walkdown include steep rock faces and access roads being off the edge of a mountain, which can be avoided or significantly reduced by incorporating minor turbine, infrastructure or road alignment adjustments, as recommended. The terrestrial biodiversity impact would be minimised by allowing for reduced cut and fill requirements, hence a slightly reduced terrestrial footprint.
- A realignment recommendation is made for a portion of the grid connection Option 1 (East) route.
 - The following specific recommendations should be included in any updated EMPr for the project.
 A flora and fauna search and rescue (relocation) must be undertaken before commencement of any vegetation clearing. A comprehensive (updated) list of species for which permits will be required will be included in permit applications, including several species not identified during the initial assessment.
- Where there are further changes/updates to the vertical and horizontal alignments of the road network and site laydown area, such sections/areas may require reassessed in order to determine any further risks and impacts to the ecology and/or species.

5 Appendices

5.1 Appendix 1: References

General Reference Sources

- Acocks, J. P. H. 1988. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marienne S. de Villiers. SANBI, Pretoria.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & Marienne S. de Villiers. (Eds). 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland. SANBI, Pretoria.
- Brauneder KM, Montes C, Blyth S, Bennun L, Butchart SH, Hoffmann M, Burgess ND, Cuttelod A, Jones MI, Kapos V, Pilgrim J, Tolley MJ, Underwood EC, Weatherdon LV, Brooks SE, 2018. Global screening for Critical Habitat in the terrestrial realm. PloS one, 13(3), p.e0193102. doi:10.1371/journal.pone.0193102
- Bromilow, C. 2001. *Problem Plants of South Africa*. A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds. Briza Publications. Pp 258
- Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. 2016. The Red List of *Mammals of South Africa, Swaziland, and Lesotho.* South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Council for Scientific and Industrial Research. NFEPA river FEPAs 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA rivers 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetland clusters 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetlands vegetation 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Cowling, R.M., Richardson, D.M. & Pierce, S.M. 1997. Vegetation of Southern Africa. Cambridge University Press.
- Driver, A., Sink, K.J., Nel, J.L., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. *National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis report.* South Africa National Biodiversity Institute and Department of Environmental Affairs, Pretoria.
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. Karroo Veld: Ecology and Management. Briza Publications.
- Fuggle, R. F. & Rabie, M. A. 2003. Environmental Management in South Africa. Juta & Co, Johannesburg.
- Germishuizen, G. & Meyer, N.L. (eds). 2003. Plants of southern Africa: An annotated checklist. Strelitzia, 14. Pretoria: National Botanical Institute.
- Golding, J. (Ed.) 2002. Southern African Plant Red Data Lists. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. Alien Weeds and Invasive Plants. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. Pp 300.
- Hilton-Taylor, C. 1996. Red Data List of Southern African Plants. National Botanical Institute.

- Hockey PAR, Dean WRJ and Ryan PG 2005. Roberts Birds of southern Africa, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.
- International Finance Corporation. 2012. Performance Standards on Environmental and Social Sustainability.
- International Finance Corporation. 2012. Performance Standards on Environmental and Social Sustainability.
- Low, A.B. & Rebelo, A.G. 1998. Vegetation of South Africa, Lesotho, and Swaziland. Pretoria: Department of Environmental Affairs and Tourism.
- M.F. Bate, W.R. Branch, A.M. Bauer, M. Burger, J. Marias, G.J. Alexander and M.S. de Villiers (eds), *Atlas and Red List of Reptiles of South Africa, Lesothos and Swaziland*. Suricata 1. South African National Biodiversity Institute, Pretoria.
- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.
- Martin CS, Tolley MJ, Farmer E, Mcowen CJ, Geffert JL, Scharlemann JPW, Thomas H, van Bochove JH, Stanwell-Smith D, Hutton JM, Lascelles B, Pilgrim JD, Ekstrom JMM, Tittensor DP, 2015. A global map to aid the identification and screening of Critical Habitat for marine industries. Marine Policy 53: 45-53. doi:10.1016/j.marpol.2014.11.007.
- Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Hening, G.A., Krüger, M., Pringle, R.L., Terblanche, R.F. & Williams, M.C. (Eds). 2013. *Conservation assessment of butterflies of South Africa, Lesotho, and Swaziland:* Red List and atlas. Saftronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (Eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho, and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho, and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Mucina, L. & Rutherford, M.C. (Eds). 2006. The vegetation of South Africa, Lesotho, and Swaziland, in Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Myers, N., Mittermeir, R.A., Mittermeir, C.G., De Fonseca, G.A.B. & Kent, J. 2000. Biodiversity hotspots for conservation priorities. Nature, 403: 853–858.
- Nel, J., Colvin, C., Le Maitre, D., Smith, J., Haines, I. 2013. Defining South Africa's Water Source Areas. WWF South Africa & Council for Scientific & Industrial Research (CSIR).
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swart, E.R., Smith-Ado, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. *Technical Report for the National Freshwater Ecosystem Priority Areas project.* Report to the Water Research Commission, WRC Report No. 1801/2/11. ISBN 978-1-4312-0149-5.
- Pienaar, K. 2000. The South African What Flower is That? Struik Publishers (Pty) Ltd. Cape Town.
- Powrie, L.W. 2013. A database of biodiversity taxon names in South Africa for copy-and-paste into reports or documents. South African National Biodiversity Institute, Cape Town. Obtained from SANBI on 20 July 2020.
- Powrie, L.W. 2013. A list of South African biodiversity terms and common names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from <u>www.sanbi.org</u> on 20 July 2020.
- Powrie, L.W. 2013. A list of South African botanical names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from <u>www.sanbi.org</u> on 18 July 2020.
- Powrie, L.W. 2013. A list of South African physical feature names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from <u>www.sanbi.org</u> on 20 July 2020.
- Powrie, L.W. 2013. A list of South African zoological and other (including fungi and lichen) names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 1: Terrestrial Component. Pretoria: South African National Biodiversity Institute.
- Samways, M.J. & Simaika, J.P. 2016. *Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index*. Suricata 2. South African National Biodiversity Institute, Pretoria.
- Samways, M.J. & Simaika, J.P. 2016. Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index. Suricata 2. South African National Biodiversity Institute, Pretoria.
- Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (Eds.). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South African National Biodiversity Institute, Pretoria. <u>http://hdl.handle.net/20</u>.
- Snyman-Van der Walt, L. 2019. Strategic Environmental Assessment for the Expansion of Electricity Grid Infrastructure in South Africa: Nama Karoo, Succulent Karoo and Desert Biomes. Council for Scientific and Industrial Research (CSIR).
- South African National Biodiversity Institute (SANBI). 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.
- Stirton, C. H. 1987. *Plant Invaders: Beautiful, but Dangerous*. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. Eskom Red Data Book of Birds of South Africa, Lesotho, and Swaziland.
- Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. 1999. Coordinated waterbird Counts in South Africa, 1992-1997. Avian Demography Unit, Cape Town.
- The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Taylor, MR, Peacock F, Wanless RW (eds). BirdLife South Africa, Johannesburg, South Africa.
- Turpie, J.K., Wilson, G. & Van Niekerk, L. 2012. National Biodiversity Assessment 2011: National Estuary Biodiversity Plan for South Africa. Anchor Environmental Consulting, Cape Town. Report produced for the Council for Scientific and Industrial Research and the South African National Biodiversity Institute.
- UN Natural Value Initiative. 2009. The Ecosystem Services Benchmark, 2009.
- Van Wyk, A.E. & Smith, G.F. 2001. Regions of Floristic Endemism: A Review with Emphasis on Succulents, Umdaus Press.
- Vromans, D.C., Maree, K.S., Holness, S.D. and Skowno, A.L. 2012. The Biodiversity Sector Plan for the Blue Crane Route Municipality. Supporting land-use planning and decision-making in Critical Biodiversity Areas and Ecological Support Areas for sustainable development. Addo Elephant National Park Mainstreaming Biodiversity Project. South African National Parks. Port Elizabeth. South Africa.
- Water Research Commission. 2017 Surface and Groundwater SWSA [Vector] 2017. Available from the Biodiversity GIS website, downloaded on 25 January 2021.
- Water Research Commission. 2017 SWSA Surface water [Vector] 2017. Available from the Biodiversity GIS website, downloaded on 25 January 2021.
- Weather Bureau. 1988. Climate of South Africa Climate statistics up to 1984 (WB40). Government Printer, Pretoria.
- Weather Bureau. 1988. Climate of South Africa Climate statistics up to 1984 (WB40). Government Printer, Pretoria.

• Young, D.J., Harrison, J.A, Navarro, R.A., Anderson, M.A., & Colahan, B.D. (Eds). 2003. Big birds on farms: Mazda CAR Report 1993-2001. Avian Demography Unit: Cape Town.

Western Cape

Web Databases and Sources

- Animal Demographic Unit: <u>http://vmus.adu.org.za</u>
- Conservation International: <u>http://www.biodiversityhotspots.org</u>
- Fitzpatrick Institute of African Ornithology (2022). MammalMAP Virtual Museum. Accessed at http://www.adu.org.za/?vm=MammalMAP on 2020-12-12.
- Fitzpatrick Institute of African Ornithology (2022). OrchidMAP Virtual Museum. Accessed at <u>http://vmus.adu.org.za/?vm=OrchidMAP</u> on 2022-12-12.
- Fitzpatrick Institute of African Ornithology (2022). PHOWN Virtual Museum. Accessed at <u>http://vmus.adu.org.za/?vm=PHOWN</u> on 2022-12-12.
- FitzPatrick Institute of African Ornithology (2022). ScorpionMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ScorpionMAP on 2022-12-12.
- Fitzpatrick Institute of African Ornithology (2022). SpiderMAP Virtual Museum. Accessed at http://www.adu.org.za/?vm=SpiderMAP on 2022-12-12.
- Global Biodiversity Information Facility (GBIF): <u>http://gbif.org</u>
- International Union for Conservation of Nature (IUCN) Redlist: <u>http://iucnredlist.org</u>
- IPIECA, https://www.ipieca.org/
- Millennium Ecosystem Assessment (MEA). 2005: https://www.millenniumassessment.org
- National Sustainable Development Strategies (NSDS): <u>https://sdgs.un.org/topics/national-sustainable-development-strategies</u>
- Plants of Southern Africa: <u>http://newposa.sanbi.org</u>
- South African National Biodiversity Institute (SANBI) Redlist: http://redlist.sanbi.org
- South African Bird Atlas Project: http://sabap2.birdmap.africa
- The South African Bat Assessment Association (SABAA): http://www.sabaa.org.za/
- United Nations Environment Programme (UNEP), A to Z Areas of Biodiversity Importance: http://www.biodiversitya-z.org
- United Nations Environment Programme (UNEP)-WCMC (2017) Global Critical Habitat screening layer (Version 1.0). Cambridge (UK): UN Environment World Conservation Monitoring Centre. http://data.unep-wcmc.org/datasets/44.
- United Nations Environment Programme (UNEP), World Database on Protected Areas, Protected Planet: <u>http://www.protectedplanet.net</u>
- World Resources Institute (WRI): <u>https://www.wri.org</u>

Previous Project Reports

- Todd, S. 2022. Proposed construction of the Koup 2 Wind Energy Facility and associated grid infrastructure, near Beaufort west, Western Cape province, South Africa: Fauna & flora specialist study. Report compiled for SiVEST Environmental on behalf of Genesis Enertrag.
- Todd, S. 2022. Proposed construction of the Koup 1 Wind Energy Facility and associated grid infrastructure, near Beaufort west, Western Cape province, South Africa: Fauna & flora specialist study. Report compiled for SiVEST Environmental on behalf of Genesis Enertrag.

5.2 Appendix 2: Abbreviations & Glossary

5.2.1 Abbreviations

CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs (now DEFF, see below)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DEFF	The Department of Environmental Affairs was renamed the Department of
	Environment, Forestry and Fisheries (DEFF) in June 2019, incorporating the forestry
	and fisheries functions from the previous Department of Agriculture, Forestry and
	Fisheries.
DEMC	Desired Ecological Management Class
DWS	Department of Water Affairs and Sanitation
DWAF	Department of Water Affairs and Forestry (former department name)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LM	Local Municipality
masl	meters above sea level
MPAH	Maputaland-Pondoland-Albany Hotspot
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, Act 107 of 1998
NFA	National Forests Act
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest Act, Act 84 of 1998
PEMC	Present Ecological Management Class
PES	Present Ecological State
PNCO	Provincial Nature and Environment Conservation Ordinance (No. 19 of 19/4).
	Red Dala List Bight Liand Side
	Record of Decision
	South African National Biodiversity Institute
SUE	Spatial Development Framework
SOFR	State of the Environment Report
SSC	Species of Special Concern
ToPS	Threatened of Protected Species
ToR	Terms of Reference
+Ve	Positive
-ve	Negative

5.2.2 Glossary

Alien Invasive Species (AIS)	An alien species whose introduction and/or spread threaten biological diversity (<u>Convention on Biological Diversity</u>). Note: "Alien invasive species" is considered to be equivalent to "invasive alien species". An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity (<u>IUCN</u>).
Best Environmental Practice	The application of the most appropriate combination of environmental control measures and strategies (Stockholm Convention).
Best Management Practice	Established techniques or methodologies that, through experience and research, have proven to lead to a desired result (<u>BBOP</u>).
Biodiversity	Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
Biodiversity Offset	Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity (BBOP).
Biodiversity Threshold	The target areas (hectares) of biodiversity which must be safeguarded for the component plants and animals to exist and for ecosystems to continue functioning (e.g. pollination, migration of animals) i.e. the target areas comprise the CBA.
Bioremediation	The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.
Boundary	Landscape patches have a boundary between them which can be defined or fuzzy (<u>Sanderson and Harris, 2000</u>). The zone composed of the edges of adjacent ecosystems is the boundary.
Catchment	In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.
Connectivity	The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.
Corridors	Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems, or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as "steppingstones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
Critically Endangered (CR)	A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an <u>extremely high risk of</u> extinction in the wild (IUCN).
Cultural	The non-material benefits people obtain from ecosystems through spiritual
Ecosystem Services	enrichment, cognitive development, reflection, recreation, and aesthetic

	experience, including, e.g. knowledge systems, social relations, and aesthetic values (<u>Millennium Ecosystem Assessment</u>).
Cumulative Impacts	The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation (BBOP).
Data Deficient (DD)	A <u>taxon is Data Deficient</u> when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat(<i>IUCN</i>).
Degraded Habitat/Land	Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
Disturbance	An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.
Ecological Function	How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.
Ecological Pattern	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.
Ecological Pattern Ecological Process	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them. Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories]
Ecological Pattern Ecological Process Ecological Processes	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them. Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories] Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened.

	more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.
Ecosystem	All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecosystem Services	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.
Ecosystem Status	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem (Millennium Ecosystem Assessment).
Ecotone	The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone.
Edge	The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.
Emergent Tree	Trees that grow above the top of the canopy
Endangered (En)	Endangered terrestrial ecosystems have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. A taxon (species) is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild (IUCN).
Endemic	A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the

	South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threated Species.
Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical, and cultural aspects.
Estuary	a partially or fully enclosed body of water -
	(a) which is open to the sea permanently or periodically; and(b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.
Evolutionary Processes	Series of actions which enable new species to evolve in response to changing Biodiversity is maintained by ecological processes at the micro-scale (such as in pollination and nutrient cycling via microbial action) through to the mega-scale (natural events e.g. fire, flood; migration of species along river valleys or coastal areas, quality and quantity of water feeding rivers and estuaries; marine sand movement and the seasonal mountain-to-coast migration of birds that pollinate plants).
Exotic	Non-indigenous; introduced from elsewhere, may also be a <i>weed</i> or alien <i>invasive</i> species. Exotic species may be invasive or non-invasive.
Fragmentation (Habitat Fragmentation)	The 'breaking apart' of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occur.
Habitat	The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.
Habitat Banking	A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time (IEEP).
IFC PS6	International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
Indicator	Information based on measured data used to represent an attribute, characteristic, or property of a system.
Indicator species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.
Indigenous	Native; occurring naturally in a defined area.
Indigenous	A species that has been observed in the form of a naturally occurring and self-
Species (Native species)	sustaining population in historical times (<i>Bern Convention 1979</i>). A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy <u>using its natural dispersal</u> <u>systems (modified after the Convention on Biological Diversity)</u>
Indirect Impact	Impacts triggered in response to the presence of a project, rather than being directly caused by the project's own operations (<u>BBOP</u>)
Instream habitat	Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;
Intact Habitat /	Land that has not been significantly impacted upon by man's activities. These
Vegetation	are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Intrinsic Value	The inherent worth of something, independent of its value to anyone or anything else.
Keystone Species	Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact,

	the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.		
Landscape	An area of land that contains a mosaic of ecosystems, including human- dominated ecosystems (<u>Millennium Ecosystem Assessment</u>).		
Landscape Approach	Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations (FAO).		
Landscape connectivity	The degree to which the landscape facilitates or impedes movement among resource patches.		
Least threatened	These ecosystems have lost only a small proportion (more than 80 % remains) of		
/ Least Concern (LC)	their original natural habitat, and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild). A <u>taxon (species)</u> is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (ILICN)		
Matrix	The "background ecological system" of a landscape with a high degree of connectivity		
Natural Forest (Indigenous Forest)	The definition of "natural forest" in the National Forests Act of 1998 (NFA) Section $2(1)(xx)$ is as follows: 'A natural forest means a group of indigenous trees • whose crowns are largely contiguous • or which have been declared by the Minister to be a natural forest under section 7(2) This definition should be read in conjunction with Section $2(1)(x)$ which states that 'Forest' includes:		
	 A natural forest, a woodland, and a plantation The forest produce in it; and The ecosystems which it makes up. 		
	The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (Podocarpus latifolius) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as:		
	 A generally multi-layered vegetation unit Dominated by trees that are largely evergreen or semi-deciduous The combined tree strata have overlapping crowns, and crown cover is >75% Grasses in the herbaceous stratum (if present) are generally rare Fire does not normally play a major role in forest function and dynamics except at the fringes The species of all plant growth forms must be typical of natural forest (check for indicator species) The forest must be one of the national forest types 		
Near Threatened	A <u>taxon (species</u>) is Near Threatened when it has been evaluated against the		
(NT)	criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (<u>IUCN</u>).		
Patch	A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit		

	of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.
Protected Area	A clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Range restricted species	Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited <u>extent of occurrence</u> (EOO):
	• For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km2).
Refugia	A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.
Rehabilitation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure (BBOP).
Resilience	The capacity of a natural system to recover from disturbance (OECD).
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions (IFC).
Riparian	Pertaining to, situated on, or associated with the banks of a watercourse, usually a river or stream.
Riparian Habitat	Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
River Corridors	River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED).
Terrestrial	Occurring on, or inhabiting, land.
Threatened Species	Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species (<i>IUCN</i>). Any species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate (<u>EU</u>).

Traditional Ecological Knowledge	Knowledge, innovations, and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry (CBD).
Transformation	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.
Transformed Habitat/Land	Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
Tributary	A small stream or river flowing into a larger one.
Untransformed Habitat/Land	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Vulnerable (Vu)	<u>Vulnerable terrestrial ecosystems</u> have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat. A <u>taxon (species)</u> is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (<i>IUCN</i>)
Watercourse	Natural or man-made channel through or along which water may flow. A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake, or dam into which, or from which, water flows. and a reference to a watercourse includes, where relevant, its bed and banks;
Weed	An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.
Wetlands	A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.

5.3 Appendix 3: Specialist Profile and Professional Registration



Jamie Pote

BIODIVERSITY ADVISOR, ECOLOGIST AND ENVIRONMENTAL SCIENTIST

CONTACT

(+27) 76 888 9890
 jamiepote@live.co.za
 Port Elizabeth, South Africa
 Linkedin.com
 Jamiepote
 Bluesky-SA

EDUCATION

Bachelor of Science Rhodes University 2002 (Botany & Environmental Science)

Bachelor of Science (Honours) Rhodes University 2003 (Botany)

Professional Natural Scientist SACNASP: 2016 (Ecological Science)

SERVICES

Terrestrial Biodiversity Specialist Assessments IFC PS6 Biodiversity & Critical Habitat Assessments Terrestrial Biodiversity Compliance Statements Geographic Information Systems Environmental Management Plans & Programmes Environmental Compliance & Monitoring Independent Environmental & Ecological reviews Bioremediation, Restoration & Rehabilitation Plans Permit and License applications (Flora & Fauna) Flora Search & Rescue Plans & Relocations Invasive Alien Plant Control & Management Plans Environmental & Mining Applications

ABOUT ME

18 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 250 projects in southern, western and central Africa. Environmental Assessment Practitioner on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. Advanced GIS mapping tools and Analysis.

EXPERIENCE AND CLIENTS

Key Sectors

- Wind, Solar Energy Facilities
- Infrastructure and Housing
- Agriculture and Forestry
- Mining and Industrial

Key Projects

- Over 250 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.
- Basic Assessments, Mining applications and compliance monitoring on over 50 projects for various clients including the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape, including over 300 individual borrow pits.
- South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Pre-Construction compliance.
- Coega Development Corporation IDZ projects Ecological assessments, Flora search & rescue and Construction monitoring.
- Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing clients.
- Various agricultural expansion and infrastructure projects.
- Various wind and solar energy and associated infrastructure projects.
- Numerous infrastructure projects including electrical, water and roads.
- Various Environmental Management and Rehabilitation Plans.

24/06/2021



PAGE INTENTIONALLY LEFT BLANK

END



BAT SITE WALK-THROUGH REPORT

THE GENESIS KOUP 2 WIND ENERGY FACILITY NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE

September 2024 Project No.: 5200 Koup 2

(DFFE REF: 14/12/16/3/3/2/2121)

GENESIS KOUP 2 WIND (Pty) Ltd.



The business of sustainability

Document details	The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.	
Document title	BAT SITE WALK-THROUGH REPORT	
Document subtitle	THE GENESIS KOUP 2 WIND ENERGY FACILITY NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE	
Project No.	5200 Koup 2	
Date	September 2024	
Version	2.0	
Author	Craig Campbell, Marck Hodgson	
Client Name	GENESIS KOUP 2 WIND (Pty) Ltd.	

Quality Management System

quality management bystem			
Issue/Revision	First Issue	Revision 1	Revision 2
Version Number	v1-0	v2-0	
Date	16 March 2023	12 September 2024	
Authors	Craig Campbell	Craig Campbell, Mark Hodgson	
Signature	C.		
Arcus Review and Approval	Ashlin Bodasing	NA	
Signature	Rades 11	NA	
ERM Review and Approval	Dieter Rodewald	Dieter Rodewald	
Signature	J.M.		

Signature Page

September 2024

BAT SITE WALK-THROUGH REPORT

THE GENESIS KOUP 2 WIND ENERGY FACILITY NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE

Stephanie Gopaul Partner and EAP

Dieter Rodewald Partner

ERM 1st Floor Great Westerford 240 Main Road Rondebosch 7700 | South Africa

© Copyright 2024 by ERM Worldwide Group Ltd and/or its affiliates ("ERM"). All rights reserved. No part of this work may be reproduced or transmitted in any form, or by any means, without the prior written permission of ERM.

CONTENTS

1.	INTRODUCTION		1
	1.1	Project Details	1
2.	TERMS	OF REFERENCE	2
	2.1	Relevant Legislation and Guidelines	2
3.	REVIEV	V OF DATA COLLECTED TO DATE	3
4.	SITE VI	SIT AIM	4
5.	METHODOLOGY		4
6.	ON-SITE OBSERVATIONS		4
7.	RECCO	MMENDATIONS AND CONCLUSION	5

APPENDIX A FIGURES

1. INTRODUCTION

Genesis Koup 2 Wind (Pty) Ltd (the applicant) received Environmental Authorisation (EA) from the Department of Forestry, Fisheries and the Environment (DFFE) for the construction of the Koup 2 Wind Energy Facility (WEF) (the development) near Beaufort West in the Western Cape Province, (DFFE Ref: 14/12/16/3/3/2/2121) on 22 September 2022.

Arcus Consultancy Services South Africa (Pty) Ltd. (an ERM group company) (hereinafter referred to as 'Arcus') were appointed by the applicant to conduct a bat specialist site walk-through of the final layout as part of the process for approval of the final site development layout and Environmental Management Programme (EMPr).

The final bat pre-construction monitoring and impact assessment report (EkoVler 2021) outlined the requirements for further consideration during the project design phase, construction phase, operational phase, decommissioning phase and cumulative impacts. Consequently, this report serves to assess the acceptability of the final WEF layout and include any additional recommendations into the EMPr (where relevant), further to the requirements already laid out in the final bat pre-construction monitoring and impact assessment report. An assessment of the corresponding grid connection will be assessed separately. The findings presented in this report are based on a specialist site visit conducted from 6 to 10 March 2023.

1.1 **Project Details**

The Koup 2 Wind Energy Facility comprises of 32 Wind Turbine Generators (WTG) with a contracted capacity of approximately 211MW. To achieve this, the WTG's that have been selected have rotor diameters and hub heights of up to 200 m. Additional infrastructures include:

- Permanent compacted hardstanding areas;
- Temporary laydown areas;
- Concrete foundations to support the wind turbines;
- Electrical transformers adjacent to each wind turbine;
- One new 33/132kV on-site substation and/or combined collector substation;
- Internal 33kV medium voltage cables connecting turbines to the substation;
- A Battery Energy Storage System (BESS), with up to 40MW of batteries using solid state / liquid flow batteries;
- Internal roads providing access to each turbine;
- One construction/laydown area;
- One 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) has already been installed;
- One temporary concrete batching plant extent to facilitate the concrete requirements for turbine foundations.

The development site is located ~55km south of Beaufort West and includes the following land portions:

- Portion 1 of the Farm Kaatjies Kraal No. 380;
- Portion 8 of the Farm Kaatjies Kraal No. 380.

2. TERMS OF REFERENCE

The terms of reference for the site walk-through, as agreed on in discussion with Genesis Eco-Energy Developments Pty (Ltd), were to:

- Conduct a walk-through of the development area;
- Verify sensitive features in the area and assess the significance thereof for the development;
- Compile a report which includes any inputs for further recommendations and potential mitigation measures, as well as update and finalise the bat monitoring programme, where relevant.

Although care was taken to ensure the proper investigation of all areas of the development, it is only reasonable to expect that not all-important bat features could be located during a single site survey.

It is emphasised that information, as presented in this report, only has bearing on the development site itself. This information cannot be applied to any other area, however similar in appearance or any other aspect, without proper investigation.

2.1 Relevant Legislation and Guidelines

The following policies and guidelines have informed the methodologies employed during the specialist site walk-through and will ensure the applicant meets all legislative requirements regarding construction and operation of the Koup 2 WEF.

- Chapter 1 of the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998).
- Convention on the Conservation of Migratory Species of Wild Animals (1979)
- Convention on Biological Diversity (1993).
- Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).
- National Environmental Management Act, 1998 (NEMA, Act No. 107 of 1998).
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
- The Equator Principles (2013).
- The Red List of Mammals of South Africa, Swaziland and Lesotho (2016).
- National Biodiversity Strategy and Action Plan (2005).
- South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities - ed 5. South African Bat Assessment Association of June 2020.
- South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities – ed 2. South African Bat Assessment Association of June 2020.
- Species Environmental Assessment Guidelines (April 2022).

3. REVIEW OF DATA COLLECTED TO DATE

Based on the pre-construction monitoring data captured by EkoVler (2021), the most important aspect of the project that would affect bat populations adversely is the wind turbines themselves, through direct collisions and barotrauma. Other potential impacts to bats due to WEF developments include the loss of existing and potential roosts. Derelict buildings, koppies with rocky ridges, low trees with associated denser vegetation along the riverbeds and livestock water points could also 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. During the monitoring period, five species were recorded with 95% of the calls belonging to the Molossidae family. Most calls were from Tadarida aegyptiaca, which was the most dominant species on site. This species has a high risk of collision and barotrauma, due to their flight and foraging behaviours within the rotor swept zone. The remainder of species recorded are represented by relatively low numbers, with 11% of the calls belonging to Sauromy petrophilus, and 4% belonging to Neoromicia capensis. 1% of calls were attributed to Miniopterus natalensis (endangered). The annual average bat activity was considered low for the respective Nama Karoo terrestrial ecoregion (EkoVler 2021).

Although the overall significance of impacts to bats varied among the different phases and type impacts, the impacts to bats, overall, were assessed to be of a medium significance before mitigation and low after mitigation. Cumulative impacts were determined to likely to be of a high significance before mitigation and medium after mitigation (EkoVler 2021).

Numerous mitigation measures, as per EkoVler (2021) were recommended, including (but not limited to):

- Operational monitoring and mitigation to be implemented upon construction of the WEF to try to curb the high collected impact.
- Turbines need to be controlled below the cut-in speed and freewheeling is not to be allowed when no power is generated.
- The final layout must adhere to the sensitivity map.
- An mitigation scheme (in accordance with section 9.2 in EkoVler 2021) should apply to operational turbines in high-medium sensitivity zones, right from the start, when turbines start to turn.
- No freewheeling of turbines is allowed when power is not generated. Turbines do not need to be at a standstill, but there should be minimum movement so that bats are not at risk when turbines are not generating power.
- Mitigation measures apply as per the EMPr.
- A minimum of two years of operational bat monitoring, as per the latest guidelines should be conducted. If the operational bat specialist is of the opinion that an extended period of operational monitoring is needed, the client should adhere to this.
- Should high mortality be experienced during operational bat monitoring, additional mitigation measures should be discussed (using section 9.2, table 7, in EkoVler 2021 as a starting point).
- Bat deterrents could be an option for mitigation but will have to be investigated, but operational monitoring should refine the mitigation protocol.

4. SITE VISIT AIM

The aim of the site visit was to conduct a site walk-through and micro-siting process to ground truth important bat features and to ensure that all turbine blades and other infrastructure are positioned outside of their respective bat sensitivity buffers.

5. METHODOLOGY

The site walk-through visit took place from 6 to 10 March 2023. Important bat features, sensitivities and final layouts were loaded onto the Avenza Maps app to ground truth the features and update the sensitivities, where relevant. All sensitive features and buffers developed during the initial preconstruction monitoring campaign were used as a baseline for the assessment during the field survey. Additional sensitive areas were then also searched for in the field to identify any potential gaps in the existing sensitivity data. The positions of the turbines, powerline, switching station, laydown area, O&M building, BESS and substation were prioritised.

6. ON-SITE OBSERVATIONS

The site is characterised by mostly flat topography with undulating hills, dominated by low karoo scrub and grasses (Picture 1) where bat activity is expected to be lower. Areas where drainage lines or other water sources are prevalent were noted to be associated with denser shrub/thicket vegetation (Picture 2) and is expected to serve as suitable foraging habitat for bats, likely accommodating higher bat activity. Overall, the sensitivities defined during the pre-construction monitoring and impact assessment phase of the project remain applicable to the site at the time of this assessment. The bat sensitive areas are mostly around drainage lines with established riparian vegetation, water points, slopes and dwellings (Appendix A).



7. RECCOMMENDATIONS AND CONCLUSION

The original sensitivity buffers defined in the pre-construction monitoring and impact assessment report defined high sensitivity zones as areas where all turbine components (including the full blade length) should be placed outside of such zones (i.e. no-go areas). The motivation for these no-go zones were mostly due to the occurrence of suitable bat foraging and roosting habitat. High-Medium sensitivity zones were defined as areas mainly comprising thicket vegetation bordering high sensitivity zones, but demonstrated lower bat activity levels - which negated the need for such areas to be defined as being highly sensitive. Placement of wind turbines within these areas would be allowed, provided that strict mitigation measures are adhered to. Medium sensitivity zones were defined as areas whereby a 35m buffer was applied around first and second order gullies, which are known to mostly contain water when there is run-off during periods of rain. These areas, in general, do not support thicket or riparian vegetation and have been associated with lower bat activity. They are subsequently not deemed relevant enough to be assigned with a higher sensitivity rating and do not warrant curtailment from the onset of the project. Turbines are however recommended to be placed outside of these zones, as far as possible. Where turbines are placed inside such zones, then results from the operational bat monitoring campaign should inform whether or not further mitigation is required, and implemented as soon as it becomes relevant.

The observations made on site confirm that the buffers previously defined during the preconstruction monitoring and impact assessment phase are sufficient and adequately represent the sensitivities expected to occur on site today. No further sensitive features were identified to be included into the existing sensitivity layout. As such, it is compulsory for the recommendations made in the original bat specialist monitoring and impact assessment report (EkoVler 2021) to be strictly adhered to, and for the original bat sensitivity buffers to be considered when finalising the wind turbine layout. No wind turbines (including the full blade length) are to be located within high sensitivity (i.e. no-go) buffers. Turbines may be sited in high-medium sensitivity buffers, provided that strict mitigation measures (as outlined in EkoVler 2021) are adhered to from the onset of project development. Turbines may also be sited within medium sensitivity areas, provided that operational monitoring results inform the need for potential future mitigation/curtailment measures. Associated infrastructures, including laydown areas, O&M buildings, an on-site substation, internal roads and the BESS are deemed permissible in sensitive areas due to the small extent and type of impacts associated with such infrastructures. However, such infrastructures should avoid high sensitivity (i.e. no-go) areas as far as possible. As recommended in the final bat monitoring and impact assessment report (EkoVler 2021), roost searches should be conducted before the construction of these components commence.

Presently, 12 wind turbines (including the maximum blade length of 100m) encroach into areas of high sensitivity (Appendix A). These turbines include T12, T20, T25, T29, T35, T40, T44, T48, T55, T60, T66, and T67. It will be mandatory for all 20 of these wind turbines to be micro-sited out of these sensitivity zones prior to the construction of the facility taking place. All further recommendations made in the final bat pre-construction monitoring and impact assessment report (EkoVler 2021) for turbines encroaching into high-medium and medium sensitivity buffers apply. No further inclusions, other than those already identified in EkoVler 2021, are required for consideration into the final EMPr.

All mitigation measures and findings proposed by EkoVler (2021) remain valid and the overall impact of turbines on bats remains low after mitigation, assuming all recommendations are adhered to. Based on the above, it is the specialists opinion that the final layout and EMPr can be approved.

APPENDIX A FIGURES



ERM has over 160 offices across more 40 countries and territories worldwide

ERM

1st Floor Great Westerford 240 Main Road Rondebosch

7700 | South Africa T +27 21 681 5400 F +27 21 686 0736

www.erm.com



ARCHAEOLOGICAL WALKDOWN SURVEY REPORT FOR THE FINAL LAYOUT OFTHE KOUP 2 WIND ENERGY FACILITY, SOUTH OF BEAUFORT WEST, WESTERN CAPE PROVINCE

(Assessment conducted under Section 38 (8) of theNational Heritage Resources Act as part of an Environmental Impact Assessment)

Prepared for

Arcus Consultancy Services South Africa (Pty) Ltd

On behalf of

Genesis Entertrag Koup 1 Wind Farm (Pty) Ltd

Draft: 14 April 2023



Prepared by:

John Gribble

ACO Associates cc c/o 5 Cannon Road, Plumstead, 7800

Phone 078 616 2961

Email: john.gribble@aco-associates.com

EXECUTIVE SUMMARY

ACO Associates cc was appointed by Arcus Consultancy Services South Africa (Pty) Ltd, on behalf of Genesis Entertrag Koup 2 Wind Farm (Pty) Ltd, to undertake an archaeological walkdown survey of the final layout of the authorised Koup 2 Wind Energy Facility (Figure 1).



Figure 1: Extract from the 1:250,000 topographic map showing the final layout plan of the Koup 2 WEF, south of Beaufort West (Source: 1:250,000 chart 3222: Beaufort West, National Geo-spatial Information, http://www.ngi.gov.za).

The walkdown survey was conducted between 17 and 24 January 2023. A previous survey conducted by PGS Heritage (Pty) Ltd in June and July 2021 as part of the heritage impact assessment informed this report.

The 2023 archaeological walkdown survey aimed to ground truth the final wind energy facility layout to:

- Assess compliance of final layout plan with recommendations of the heritage impact assessment and the Environmental Authorisation conditions.
- Identify any further heritage resources which may be impacted by the construction, operation and decommissioning of the wind energy facility and assess their significance.
- Provide recommendations for any specific mitigation measures to be included in the updated project Environmental Management Programme.

Findings

Archaeology: The walkdown survey noted the same widespread but fairly thin occurrence

of mainly Middle Stone Age archaeological material of relatively low significance reported across much of the study area by PGS Heritage and concluded that the overall impacts to this material arising from the construction, operation and decommissioning of the wind energy facility will be low.

Nine additional archaeological occurrences were recorded during the walkdown survey, the bulk of which were ephemeral scatters of Middle Stone Age flaked stone, with some Later Stone Age lithics also present. Most of these scatters were ungradable and are considered not to be conservation-worthy but four more dense lithic scatters were graded 3C and should be avoided during the WEF-related construction activities.

Built Environment: Most of the built structures identified by PGS Heritage are in proximity to the current farm road which runs to and through the WEF. This road will be upgraded to form the Koup 1 and 2 WEF access road and the proposed OHPL will run parallel to it for much of its length. Most of these buildings are sufficiently far from the road that direct impacts from WEF infrastructure will not occur.

However, the building at KT-03 is very close to the existing road which is also the alignment of the access road in the final WEF layout, and which lies within the 30 m buffer recommended around this site by PGS Heritage.

A similar situation applies around the two historical Reynartskraal buildings at KT-04 and PGS Heritage did not recommend any mitigation in respect of these historical buildings, the existing farm road, which is to be upgraded and used as the WEF access road, passes within 10 m of the front of the main house. There is the potential for the increase in heavy traffic past these buildings during the construction of the WEF to cause impacts.

The laydown and O&M areas for the Koup 2 WEF are approximately 85 m south of KT-04. These two areas are located on the top and far side of a low hill and will have no direct impact on the Reynartskraal buildings, but there is likely to be a visual impact, especially during the construction phase when the laydown area will be in use.

The modern labourers' cottage KO-04, which is located outside the Koup 2 WEF but close to the access road and OHPL, and will not be directly affected by the upgrade of the road but the OHPL passes almost directly over the building. While this is not a heritage issue, given the building's age, it may be health / living environment issue.

Apart from the historical buildings previously recorded by PGS Heritage at Reynartskraal (KT-04) and KT-03, only one other building was recorded within the Koup 2 WEF during the ACO walkdown. This was a relatively modern, two-roomed labourers' cottage (JG005) with a corner hearth in one room. The structure is built of fired bricks with a hard mortar and hard plaster and steel-framed windows and is unlikely to be older than 60 years. It was graded NCW. The structure is located approximately 150 m south of the Koup 2 O&M and laydown areas and will not be directly affected by either.

Graves and Burials: With respect to the graves and burial grounds identified in 2021-2022, these all lie outside the boundary of the Koup 2 WEF, in proximity to the access road and OHPL. The final proposed access road and OHPL alignment are both at least 200 m from the formal graveyard (KO-07) and possible grave (KO-08) associated with the Kareerivier farm complex, and the informal graveyard (KO-06) possibly associated with the Platdoring complex and well beyond the 50 m buffer recommended around these sites in the HIA.

The informal graveyard (KO-06) is approximately 45 m from the roadway and while this is

likely to be sufficient to ensure that it is not impacted by the access road, it means that the imposition of a 50 m buffer is not practical. Furthermore, the proposed final OHPL alignment appears to pass almost directly over the graves and the potential for impacts is high.

The single isolated grave, KO-09, is directly adjacent to the access road and is very likely to be impacted by its upgrade for the WEF unless the road alignment is amended.

PGS Heritage did not report any graves or burial grounds <u>within</u> the Koup 2 WEF but two possible, isolated graves were recorded by ACO during the 2023 walkdown survey (JG020 and JG006). Although it is possible that neither are graves, their form, and the location of JG006 in particular near to the labourers' cottage suggests that they could be. They have both thus been given a grading of 3A.

Recommendations

Archaeology: Four of the archaeological occurrences recorded by PGS Heritage in the 2022 (KT-06, KT-08, KT-10, KT-12) are likely to be impacted by the final layout of the Koup 2 WEF. However, none of the archaeological material identified by PGS Heritage was assessed to be conservation worthy so impacts to these sites, should they occur, are not considered to be significant.

Five of the nine lithics scatters recorded by ACO during the walkdown survey undertaken in January 2023 (JG003, JG004, JG010, JG017, JG022) are not considered conservation worthy and should they be impacted by the WEF there will not be a significant loss to archaeology. The remaining four sites were graded 3C (JG018, JG019, JG021, G004).

Of these sites, only G004 is located in close proximity to WEF infrastructure and it is <u>recommended</u> that a buffer of 20 m is implemented around this site, and that it is physically cordoned off during construction to ensure that the archaeological material is not damaged or disturbed.

The remaining three sites are sufficiently distant from any WEF infrastructure that in the normal course of construction activities they will not be subject to impact. However, these sites must be <u>avoided</u> by construction contractors and may not be disturbed or damaged and nothing may be removed from them.

The possibility exists that buried archaeological material will be exposed during earthworks for the WEF. All archaeological material over 100 years of age is protected and may only be disturbed or removed from its place of origin under a permit issued by HWC.

In the event of anything unusual being encountered, the project archaeologist and HWC must be notified and consulted immediately so that mitigatory action can be determined and be implemented, if necessary. Mitigation is at the cost of the developer, while time delays and diversion of machinery/plant may be necessary until mitigation in the form of conservation or archaeological sampling is completed.

Provided these mitigation measures are implemented, overall impacts to archaeological material arising from activities related to the construction, operation and decommissioning of the Koup 2 WEF will be <u>low</u>.

Built Environment: Of the four built structures recorded by PGS Heritage <u>within</u> the Koup 2 WEF footprint, their assessment was that the modern labourers' cottage (KT-01), the Glen farm complex (KT-02) and the historical Reynartskraal farmstead (KT-04) would not be

impacted, and no mitigation was required. Only the historical stone and brick cottage, KT-03, situated directly next to the access road would be impacted by the construction of the WEF and they <u>recommended</u> that a no-go-buffer-zone of at least 30 m is implemented around this building.

ACO's January 2023 walkdown survey confirmed the PGS Heritage assessment in respect of the modern labourers' cottage KT-01 and the Glen farm complex (KT-02) but found the following in respect of KT-03 and KT-04:

 The access road alignment in the final Koup 2 WEF layout plan appears to be unchanged from that assessed by PGS Heritage, and still goes directly past KT-03. The 30 m buffer recommended by PGS has thus <u>not</u> been considered in planning the final alignment of the access road.

ACO <u>supports</u> the retention of the recommended buffer around this historical structure, which is very likely suffer to suffer adverse effects from the increased traffic and the passage of heavy vehicles the upgrade of this road to serve the WEF will occasion. ACO recommends that the access road alignment near thus structure is:

- Shifted at least 30 m to the west, to respect the no-go buffer; or
- That the building is avoided using the alternative access road routing we suggest below with regard to the Reynartskraal farmstead (KT-04).
- ACO does not support the PGS Heritage assessment that there will be no impact to the Reynartskraal farmstead (KT-04) and that no mitigation is required. This historical farmhouse and associated outbuilding are within 10 m of the existing farm road which is to be upgraded to serve as the WEF access road. The widening of the road, increased traffic, and the passage of heavy vehicles, especially during the construction of the WEF, are very likely to negatively affect these buildings.

ACO would, ordinarily recommend a no-go buffer around this historical complex, but the existing roadway here is sandwiched into an area less than 25 m wide between the buildings on one side and a deep river cutting on the other.

ACO therefore <u>recommends</u> that an alternative route for this section of the proposed WEF access road is sought, which will avoid both KT-04 and KT-03.

We <u>suggest</u> that a new section of access road is added to the internal road that will serve WTGs 47 and 50, planned just south of the Reynartskraal farmstead. This will route the WEF access road to the west and behind the KT-04 farmstead, to rejoin the current farm road / access road alignment somewhere between KT-03 and the start of the internal road that will serve the BESS, the onsite substation and a number of WTGs. A possible circular stone structure was noted in satellite images on the plateau above the KT-04 farmstead and if a new road is considered in this area, this feature must be avoided.

- ACO <u>notes</u> that the laydown and O&M areas for the Koup 2 WEF are approximately 85 m south of KT-04. These two areas are located on the top and far side of a low hill and will have no direct impact on the Reynartskraal buildings, but there is likely to be a visual impact, especially during the construction phase when the laydown area will be in use.
- Lastly, the final WEF layout meets the requirements of guidelines published by the Western Cape Provincial Government (2006) which recommend a minimum distance of at least 500 m between WTGs and buildings/structures older than 60 years. ACO can

confirm that there are no WTGs located less than 850 m from any of the built structures described above.

In respect of the five built structures <u>outside</u> the WEF footprint but in proximity to the access road and OHPL the following applies:

- KO-01 is a modern labourers' cottage which is not conservation worthy. No mitigation is required although it will not be directly affected by the access road or OHPL.
- The access road and OHPL alignments shown in the final layout of the Koup 2 WEF are both outside the 30 m no-go buffers zones recommended by PGS Heritage around from the outer limits of the KO-03 / KO-02 (Kareerivier) and KO-05 (Platdorings) farmsteads. These farmsteads will thus not be subject to direct project-related impacts.
- The only other structures identified in the HIA is the modern labourers' cottage KO-04. This may be affected by the OHPL which on its current alignment passes almost directly over the building. While this is not a heritage issue, given the building's current age, it may be health / living environment issue if the cottage is still used.

Impacts to the built environment, both within the WEF and along the access road and OHPL, from activities related to the construction, operation and decommissioning of the Koup 2 WEF will be <u>low</u>, provided the mitigation measures recommended above are implemented.

Graves and Burials: ACO recorded two possible, isolated graves during the 2023 walkdown survey (JG020 and JG006). These have both been graded 3A and <u>must</u> be avoided during the construction of the Koup 2 WEF. ACO <u>recommends</u> that a 50 m no-go buffer is implemented around both sites.

It is further <u>recommended</u> that JG006, which lies within 30 m of the southern edge of the Koup 2 laydown area, is physically cordoned off during construction to ensure that it is not damaged or disturbed.

In respect of the four know or possible graveyards and/or graves <u>outside</u> the WEF footprint but in proximity to the access road and OHPL identified by PGS Heritage, the following can be stated:

- ACO's review of the final WEF layout of the Koup 2 WEF <u>confirms</u> that the proposed access road and OHPL are more than 200 m from the formal graveyard (KO-07) and possible grave (KO-08) associated with the Kareerivier farm complex and from the informal graveyard (KO-06) possibly associated with the Platdoring complex each of which PGS Heritage recommended should be buffered by 50 m. The recommendation of the HIA have thus been met and there will be no direct impacts to these graves and graveyards arising from the construction of the access road or OHPL.
- The informal graveyard (KO-06) is approximately 45 m from the roadway and while this
 is likely to be sufficient to ensure that it is not impacted by the upgrade and use of the
 access road, it does mean that the imposition of a 50 m buffer is not practical, ACO
 therefore recommends that this buffer is reduced to 40 m and that it is physically
 cordoned off during construction to ensure that the graves are not damaged or disturbed.
 Furthermore, the proposed final OHPL alignment appears to pass almost directly over
 KO-06 and the potential for impacts is high. It is recommended that the alignment of the

OHPL in the vicinity of KO-06 follows that indicated in the final WEF layout to ensure that there are no impacts to this informal burial ground.

• Lastly, the single isolated grave, KO-09, is still directly adjacent to the access road and the 50 m buffer recommended by PGS <u>has not</u> been implemented. It is <u>recommended</u> that the proposed access road alignment is amended in the vicinity of KO-09 to ensure that the grave is not impacted. It is <u>suggested</u> that the 50 m buffer may be reduced to 20 m, but that should this occur, it must be a requirement that KO-09 is physically marked off during construction to ensure that grave is not damaged or disturbed.

If any of the identified graves need to be relocated because of the development of the WEF, a Grave Management Plan <u>must</u> be drafted and approved HWC, before graves are moved.

Unmarked, pre-colonial graves may occur within the WEF or along the access road or OHPL outside the WEF boundary, particularly along river courses and within valleys where there is soft soil suitable for interment. In the event that any human remains be disturbed, exposed or uncovered during excavations and earthworks for the WEF, work in the vicinity <u>must</u> cease immediately, the remains made secure and left in situ, and the project archaeologist and HWC notified so that a decision can be made about how to mitigate the find.

Provided the mitigation measures above are implemented, impacts to graves and burials from activities related to the construction, operation and decommissioning of the WEF and access road and OHPL will be <u>low</u>.

Conclusions

In terms of the acceptability of the proposed final Koup 2 WEF layout and access road and OHPL to heritage resources, although there remains some potential for impacts arising from the construction of the WEF, these impacts are not likely to be significant given the overall nature of archaeological resources in the area.

It is our reasoned opinion, therefore, that the final Koup 2 WEF layout has avoided and excluded most identified heritage resources and, provided the recommendations made and mitigation measures set out above are included in the EMPr and effectively implemented before and during construction, the final site layout plan is considered acceptable from a heritage perspective and development can proceed.

DECLARATION OF SPECIALIST INDEPENDENCE

I, John Gribble, as the appointed independent specialist hereby declare that I:

- Acted as the independent specialist in this application.
- Regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act.
- Have and will not have no vested interest in the proposed activity proceeding.
- Have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act.
- Am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification.
- Have ensured that information containing all relevant facts in respect of the specialist input/studywas distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study.
- Have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application.
- Have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- Have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- Am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:

<u>Name of company</u>: ACO Associates cc <u>Date</u>: 4 April 2023

THE AUTHOR

John Gribble has an MA (UCT, 1989), in archaeology and has been working in cultural resource management since the early 1990s. He has worked in both the regulatory and commercial heritage management fields: the former during 13 years at the National Monuments Council / South African Heritage Resources Agency (SAHRA), and the latter as both a terrestrial and maritime archaeological consultant in South Africa and the UK.

He holds archaeological accreditation with the Association of Southern African Professional Archaeologists CRM section (Member #43) as follows:

- Principal Investigator: Maritime Archaeology and Colonial Archaeology; and
- Field Director: Stone Age Archaeology.

A signed and certified specialist statement of independence is attached to this report as Appendix 1 and the author's CV is attached as Appendix 2.

GLOSSARY

Archaeology: Remains resulting from human activity which is in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

Early Stone Age: The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999.

Hornfels: A type of indurated shale used in the production of stone tools in the Karoo.

Late Stone Age: The archaeology of the last 20 000 years associated with fully modern people.

Middle Stone Age: The archaeology of the Stone Age between 20 000-300 000 years ago associated with early modern humans.

SAHRA: South African Heritage Resources Agency – the compliance authority which protects national heritage.

ACRONYMS

Environmental Authorization	
Environmental Impact Assessment	
Environmental Management Programme	
Early Stone Age	
Global Positioning System	
Heritage Impact Assessment	
Heritage Western Cape	
Late Stone Age	
Middle Stone Age	
Not Conservation Worthy	
National Heritage Resources Act	
Overhead Powerline	
South African Heritage Resources Agency	
Wind Energy Facility	
Wind Turbine Generator	
Table of Contents

E	XECUTI	VE SUMMARY	2
	Finding	35	2
	Recom	mendations	4
	Conclu	sions	7
D	ECLAR	ATION OF SPECIALIST INDEPENDENCE	8
Т	HE AU1	HOR	9
G	LOSSA	RY	
^		ллс	
A			
1	//N /	RODUCTION AND TERMS OF REFERENCE	
2	PRC	DJECT DESCRIPTION	
3	LEG	ISLATION	
4	ME	THODOLOGY	
	4.1	Limitations and Assumptions	17
5	SIT	E DESCRIPTION AND HERITAGE BACKGROUND	
	5.1	The Archaeological Context	20
	5.2	The Historical Context	20
6	FIN	DINGS OF THE 2020-2021 and 2023 SURVEYS	
	6.1	2020-2021 Survey	20
	6.1.1	Archaeology	21
	6.1.2	Built Environment	
	6.1.3	Graves and Burials	
	6.1.4	Recommendations of the 2022 HIA	23
	6.2	2023 Pre-Construction Walkdown Survey	23
	6.2.1	Assessment of 2021-2022 Recommendations against Final Layout	23
	6.3	2023 Walkdown Survey Results	28
	6.3.1	Archaeology	
	6.3.1	Built Environment	
	6.3.2	Graves and Burials	
7	PO	TENTIAL IMPACTS AND RECOMMENDED MITIGATION MEASURES	FOR INCLUSION
IN	I THE E	MPR	
	7.1	Archaeology	31
	7.2	Built Environment	32
	7.3	Graves and Burials	35

8	CONCLUSIONS	36
9	REFERENCES	37
APPI	ENDIX 1: SPECIALIST DECLARATION	38
APPI	ENDIX 2: CURRICULUM VITAE – JOHN GRIBBLE	39
APPI	ENDIX 3: LIST OF HERITAGE SITES RECORDED IN 2020-2021 ARCHAEOLOGICAL SURVE 48	Y
APPI SUR	ENDIX 4: LIST OF HERITAGE SITES RECORDED IN 2022 ARCHAEOLOGICAL WALKDOWN VEY	I 53

Figure 1: Extract from the 1:250,000 topographic map showing the final layout plan of the Koup 2 WEF, south of Beaufort (Source: 1:250,000 chart 3222: Beaufort West, National Figure 2: Final layout plan of the Koup 2 WEF south of Beaufort West, showing WTG positions (numbered yellow dots), turbine roads (red lines), access road (orange line), 33 kV powerline with pylons (green line/purple dots), and construction laydown, onsite substation and other work areas (coloured rectangles). The dark blue lines mark the WEF boundary Figure 3: Archaeological survey coverage of the Koup 2 WEF, access road and OHPL. 2021 sites identified by PGS = orange points numbered "KT"; 2023 walkdown survey = pale blue Figure 4: Comparison of heritage site locations recorded by PGS Heritage with the final Figure 5: The historical building KT-03 buffered by the recommended 30 m (purple polygon), showing the position of the current farm road and proposed access road within the buffer. 24 Figure 6: The historical Reynartskraal farm complex (KT-04) showing the position of the current farm road and proposed access road less than 10m from the front of the main house. Note also the proximity of the Koup 2 O&M area (yellow rectangle) and laydown area (beige Figure 7: Proximity of access road (orange line) and OHPL (green line) to modern labourers' cottage KO-04 (red circle). The cottage is approximately 25 m from the current roadway (red arrow) and will not be affected by the roadway upgrade, but the proposed OHPL appears to pass directly over the structure. Note also the location of the Platdorings farm complex (KO-Figure 8: Location of informal graveyard KO-06 in relation to the Koup 1 and 2 access road (orange line) and OHPL (green line). The lack of pylon positions shown at the two redstarred points on the OHPL suggests that it will follow the line between the two marked Figure 9: Location of grave KO-09 directly adjacent to current farm road / Koup 1 and 2 WEF Figure 10: 2023 walkdown survey waypoints (dots marked JG or G) overlaid on the final Figure 11: Suggested alternative alignments for the WEF access road in the vicinity of KT-04 and KT-03 (dotted pale blue and purple lines) to replace the current portion of the access road (orange line) that passes very close to these historical buildings. A possible circular

stone feature circled in yellow must be avoided if a roadway in this vicinity is planned....... 34

Plate 1: View to south-east from access road to WTG60 (Photo: J Gribble)	19
Plate 2: View to the north across the WEF from near WTG 41 (Photo: J Gribble)	19
Plate 3: Example of the MSA lithics recorded at JG019. The two pieces at bottom right may	у
be ESA (Photo: J Gribble)	29
Plate 4: Historical stone boundary marker JG002 (left). Detail from the relevant 1:50,000	
topographic map sheet showing a farm boundary (black line) very close to the position of	
JG002. (Photo: J Gribble / 1:50,000 chart 3222CD, National Geo-spatial Information,	
http://www.ngi.gov.za)	30
Plate 5: Stone mound JG020 (Photos: J Gribble)	30
Plate 6: Front and rear elevations of the modern labourers' cottage JG005 (Photos: J	
Gribble).	31
Plate 7: Three views of the stone mound JG006 which may be a grave (Photos: J Gribble)	
	31

1 INTRODUCTION AND TERMS OF REFERENCE

ACO Associates cc were appointed by Arcus Consultancy Services South Africa (Pty) Ltd, on behalf of Genesis Entertrag Koup 2 Wind Farm (Pty) Ltd, to undertake an archaeological walkdown survey of the final layout of the authorised Koup 2 Wind Energy Facility (WEF).

The Koup 2 WEF will be located some 55 km south of Beaufort West in the Western Cape Province (Figure 1 and Figure 2).

As part of the Environmental Impact Assessment (EIA) process, the Koup2 WEF was subject to an archaeological assessment conducted by PGS Heritage (Pty) Ltd, which included a survey of the WEF project area in June and July 2021 (Fourie 2022).

This current, pre-construction archaeological walkdown report draws on information presented by PGS Heritage in the archaeological impact assessment (AIA) which supported their heritage impact assessment (HIA) (Mann 2022b).

The 2023 archaeological walkdown survey aimed to ground truth, as far as possible, the authorised wind turbine generator (WTG) positions, internal WEF cable and road alignments, substation sites, laydown areas, etc., to:

- Assess compliance of final layout plan with recommendations of the HIA and the Environmental Authorisation (EA) conditions.
- Identify heritage resources which may be impacted by the construction, operation and decommissioning of the WEF and assess their significance.
- Provide recommendations for any specific mitigation measures to be included in the updated project Environmental Management Programme (EMPr).

2 PROJECT DESCRIPTION

(TO BE INSERTED BY ERM / ARCUS)

3 LEGISLATION

The basis for all heritage impact assessment is the National Heritage Resources Act 25 (NHRA) of 1999. The Act has defined certain kinds of heritage as being worthy of protection, by either specific or general protection mechanisms.

In South Africa the law is directed towards the protection of human made heritage, although places and objects of scientific importance, such as palaeontology, are also included. The NHRA also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage which must be considered in any heritage assessment includes:

- Buildings and structures (older than 60 years of age)
- Archaeological sites (older than 100 years of age)
- Palaeontological sites and specimens
- Shipwrecks and aircraft wrecks
- Graves and graveyards
- Cultural landscapes.



Figure 2: Final layout plan of the Koup 2 WEF south of Beaufort West, showing WTG positions (numbered yellow dots), turbine roads (red lines), access road (orange line), 33 kV powerline with pylons (green line/purple dots), and construction laydown, onsite substation and other work areas (coloured rectangles). The dark blue lines mark the WEF boundary (Source: Google Earth).

4 METHODOLOGY

This report is based on:

- The 2021 archaeological fieldwork and 2022 impact assessment for the Koup 2 WEF contained in the AIA and HIA.
- Available archaeological reports and impact assessments conducted in the vicinity of the project.
- The results of the pre-construction archaeological walkdown survey undertaken by ACO Associates in January 2023.

The pre-construction walkdown was undertaken John Gribble and Gail Euston-Brown between 17 and 24 January 2023.

The archaeological team each carried a hand-held GPS receiver (using the WGS84 datum), pre-loaded with the footprint of the project elements and other data such as the WEF and farm boundaries and the positions of the sites previously recorded by PGS. These were used to log the survey tracks and record the positions of new heritage resources identified (Figure 3).

No archaeological material was removed from the project area during either of the field assessments but was, instead, recorded and photographed *in situ*, and each site was given a significance rating and assessed in terms of whether it required mitigation.

Both archaeologists were suitably qualified and experienced to date and characterise any heritage resources encountered during the survey.

4.1 Limitations and Assumptions

Parts of the WEF are remote and difficult to access. In some areas, roads and tracks marked on maps or visible in historical satellite imagery were overgrown, making access by vehicle to some areas challenging.

Heat was also a factor during the survey with daytime temperatures of 40 degrees + for much of the fieldwork period.

Despite these limitations, the coverage of the WEF site achieved by the archaeological walkdown survey is deemed adequate.

Ground visibility across most of the WEF area was good with vegetation cover not unduly affecting the archaeological survey outcomes (Plate 1 and Plate 2).

Given the substantial body of spatial information generated by the 2021 and 2023 archaeological surveys of the WEF area, we are confident that the significant heritage issues have been identified and suitable mitigation measures have been proposed for inclusion in the updated EMPr, and that no further heritage survey is necessary.



Figure 3: Archaeological survey coverage of the Koup 2 WEF, access road and OHPL. 2021 sites identified by PGS = orange points numbered "KT"; 2023 walkdown survey = pale blue lines and points numbered "JG" and "G" (Source: Google Earth).



Plate 1: View to south-east from access road to WTG60 (Photo: J Gribble).



Plate 2: View to the north across the WEF from near WTG 41 (Photo: J Gribble).

5 SITE DESCRIPTION AND HERITAGE BACKGROUND

The Koup 2 WEF is located approximately 55 km south of Beaufort West, and 11,5 km west of the N12 which connects Beaufort West to Oudtshoorn.

The underlying geology of the WEF is continental (fluvial/lacustrine) sediments of the Abrahamskraal Formation (Lower Beaufort Group) and rock types encountered on site include mudstones, siltstone, carbonates, and fine-grained sandstones, some of which have been silicified and metamorphosed (Webley 2021, Fourie 2022).

The site is on the wide plain called "*Die Vlakte*" or The Koup, between the Nieuweveld mountains in the north and the Swartberg range in the south, and is characterized by low relief, gently rolling to hilly terrain between 1000 to 1100 m above mean sea level (Webley 2021).

The area has undergone extensive erosion which has resulted in the development of scree slopes and rocky gullies. The low-lying flat area between the hills are frequently cut by ephemeral streams and areas sheet wash are common (Fourie 2022).

The vegetation is predominantly karroid bossieveld, with trees confined to shallow, intermittent-flowing drainage lines and shallow, gravelly soils (Webley 2021).

5.1 The Archaeological Context

The area is known to have been inhabited since the Early Stone Age (ESA) and throughout the Middle Stone Age (MSA). MSA surface lithic scatters predominate as a background "litter" of material across the landscape but can occur in denser concentrations in certain localities (Webley 2021). Cape Archaeological Survey & Associates (2016) recorded a few such MSA 'sites' on nearby Trakaskuilen which they described as "a dense scatter of artefacts comprising cores, flakes and blades of fine-grained chert, frequently occurring on elevated ridges" (Webley 2021:19).

Webley (2021:19) also cites a 2019 PGS Heritage (2019) heritage assessment in the same area which reports "two sites characterised by low to medium density scatters of lithics consisting of cores and flaked debitage". The "raw material varied from medium to fine-grained quartzite pebbles used in the production of ESA choppers and cleavers to fine grained chert associated with MSA cores and flaked debitage". Webley (2021) notes that these lithics were Later Stone Age (LSA) rather than ESA, however.

The LSA is generally associated with the ancestors of the San hunter-gatherer groups who roamed this area periodically and depending on rainfall during the last 30 000 years. Within the last 2 000 years pastoralists (Khoekhoen) arrived in the area and although their remains have been recorded in the Zeekoei River Valley to the north-east, none have been reported in the Koup area.

Rock art is rare in this area but when found more usually takes the form of rock engravings on the dark dolerite boulders that characterise parts of the Karoo rather than paintings. No rock engravings have been reported by the projects referred to above (Cape Archaeological Survey 2016, PGS Heritage 2019, Webley 2021, Fourie 2022).

5.2 The Historical Context

The most recent archaeological layer in the Karoo landscape relates to the historical occupation of the area by stock farmers of European descent from the late 18th century. These European pastoralists, were highly mobile – hence the name trekboers – tending to move between winter and summer grazing on and off the Great Escarpment respectively.

Land ownership was originally informal and only became regulated after the implementation of the quitrent system of the 19th century used by the Government to control the lives and activities of the farmers. However, judging by the kinds of artefacts and structures found on the landscape, many of the farms in the Karoo are likely to have been used before land was formally granted or loaned in the early 19th century (Sampson et al, 1994).

Although the Roggeveld and Nuweveld were extensively settled between 1740 and 1770, farms to the south of Beaufort West (in the vicinity of the study area) were settled relatively late, as they lacked permanent water (Guelke & Shell, 1992).

6 FINDINGS OF THE 2020-2021 and 2023 SURVEYS

6.1 2020-2021 Survey

PGS Heritage conducted a "selective archaeological, palaeontological, and cultural landscape survey of the study area" between November 2020 and July 2021 to support the HIA. The survey focussing on the areas "identified for the placement of the proposed turbines and associated internal roads, laydown areas and substation sites within the larger assessment area. Farmsteads and structures were documented from their property boundaries when access was restricted" (Fourie 2022:viii).

This PGS Heritage survey identified 21 heritage sites within the WEF and along the OHPL: nine (9) historical built structures, four (4) graves, burial grounds or possible graves and seven (7) archaeological occurrences.

These sites are shown in Figure 4 below and described in Appendix 3 below.

6.1.1 Archaeology

All of the archaeological occurrences (KT-05 – KT-12) were described as find spots consisting of low densities of mainly MSA flakes and debitage, although at some places ESA and LSA artefacts were also observed.

All of these artefact occurrences were found in heavily deflated and eroded areas and were assessed to be of <u>low</u> heritage significance and graded as <u>Not Conservation Worthy</u> (NCW).

No mitigation was recommended for any of the archaeological occurrences.

6.1.2 Built Environment

Four built structures were recorded within the Koup 2 WEF footprint, and five in proximity to the WEF access road and OHPL.

Of these, PGS Heritage (Fourie 2022b) reports that three are modern labourers' houses (KT-01, KO-01 and KO-04), based both on their construction and on mapping information which shows that these building are all currently less than 60 years old. They were thus graded <u>NCW</u>.

The five structures were given a <u>medium</u> heritage significance are:

- the Glen Farmstead (KT-02) which comprises two main buildings and other associated farm structures.
- a white-washed stone and brick building (KT-03).
- The Reynartskraal farm complex (KT-04).
- a flat-roofed stone house and associated modern kraal (KO-03) on the farm Kareerivier (Portion 11 of Farm 380).
- the Platdorings farmstead (KO-05) (Portion 5 of Farm 380) which consists of four buildings and associated farm structures.

These structures are older than 60 years of age and were given a grading of <u>3B</u>.

KO-02 is the ruin of a packed stone and mudbrick structure close to the access road and OHPL. It is clearly more than 60 years of age and was assessed to be of low heritage significance and graded $\underline{3C}$.



Figure 4: Comparison of heritage site locations recorded by PGS Heritage with the final Koup 2 layout and access road and OHPL alignments (Source: Google Earth).

6.1.3 Graves and Burials

All of the graves and graveyards recorded in the 2021-2022 survey are located along the access road and OHPL outside of the Koup 2 WEF footprint.

They comprise a formal, fenced graveyard (KO-07) adjacent to the Kareerivier farm complex which contains four graves (6 burials) with headstones and granite grave furniture all of which are of members of the Bothma family. The burials date between 1947 and 2006.

A possible unmarked grave (KO-08) indicated by a pile of rocks was recorded adjacent to the house. The location of the site in the middle of the farm werf suggests that this may not be a grave, but as a precaution PGS Heritage's assessment is retained.

Another possible single grave (KO-09), indicated by vertical rocks marking the head and foot of the grave, was recorded next to the access road on the southern boundary of the farm Platdorings.

Lastly, an informal burial ground (KO-06) with four stone-packed graves was found, approximately 85 and 175 m from the labourers' cottage KO-04 and the Platdorings farm complex respectively.

All the graves and possible graves were given a <u>high</u> heritage significance rating and graded <u>3A</u>.

6.1.4 Recommendations of the 2022 HIA

The HIA (Fourie 2022) made the following site-specific recommendations:

- Archaeology: No mitigation of any of the recorded sites was required.
- **Built Environment**: No mitigation was required in respect of KT-01, KT-02, KT-04, KO-01, KO-02 and KO-04 as they were unlikely to be affected by the proposed development of the WEF.

30 m buffer zones were recommended around KT-03 and around the outer limits of the KO-03 (Kareerivier) and KO-05 (Platdorings) farmsteads. If development occurs within 30 m of KT-03 or KO-03, the buildings will need to be satisfactorily studied and recorded before impact occurs.

• **Graves and Burials**: All the graves and burial grounds should be subject to a 50 m buffer and should be avoided and left in situ.

If, for any reason, any of the graves need to be relocated because of the development of the WEF, a Grave Management Plan should be developed and approved HWC, before graves are moved.

6.2 2023 Pre-Construction Walkdown Survey

6.2.1 Assessment of 2021-2022 Recommendations against Final Layout

The final layout for the Koup 2 WEF was amended after the completion of the 2022 HIA and one of the aims of the recent 2023 walkdown survey was to assess compliance of the final layout plan with HIA recommendations and EA conditions.

The survey found that:

- The **archaeological occurrences** KT-06, KT-08, KT-10 and KT-12 are likely to be impacted by the final layout. However, <u>none</u> of the archaeological occurrences identified by PGS Heritage, were assessed to be conservation worthy so impacts to these sites, should they occur are not considered to be significant.
- Most of the **built structures** identified by PGS Heritage are in proximity to the current farm road which runs to and through the WEF. This road will be upgraded to form the Koup 1 and 2 WEF access road and the proposed OHPL will run parallel to it for much of its length.

Most of these buildings are sufficiently far from the road that direct impacts from WEF infrastructure will not occur.

However, the building at KT-03 is very close to the existing road which is also the alignment of the access road in the final WEF layout, and which lies <u>within</u> the 30 m buffer recommended around this site by PGS Heritage (Figure 5).



Figure 5: The historical building KT-03 buffered by the recommended 30 m (purple polygon), showing the position of the current farm road and proposed access road <u>within</u> the buffer.

A similar situation applies around the two historical Reynartskraal buildings at KT-04. Although PGS Heritage did not recommend any mitigation in respect of these historical buildings, Figure 6 below shows that the existing farm road, which is to be upgraded and used as the WEF access road, will pass within 10 m of the front of the main house. There is the potential for the increase in heavy traffic past these buildings during the construction of the WEF to cause impacts.

The laydown and O&M areas for the Koup 2 WEF are approximately 85 m south of KT-04. These two areas are located on the top and far side of a low hill and will have no direct impact on the Reynartskraal buildings, but there is likely to be a visual impact, especially during the construction phase when the laydown area will be in use.



Figure 6: The historical Reynartskraal farm complex (KT-04) showing the position of the current farm road and proposed access road less than 10m from the front of the main house. Note also the proximity of the Koup 2 O&M area (yellow rectangle) and laydown area (beige rectangle)approximately 85 m south of the buildings.

The modern labourers' cottage KO-04, which is located outside the Koup 2 WEF but close to the access road and OHPL, will not be directly affected by the upgrade of the road. However, as shown in Figure 7 below, the OHPL passes almost directly over the building and while this is not a heritage issue, given the building's age, it may be health / living environment issue.

Figure 7 also indicates the distance of the Platdorings farm complex (KO-05) from the access road and OHPL (approximately 100 m) which respects the 50 m buffer around the complex recommended by the HIA (Fourie 2022b).



Figure 7: Proximity of access road (orange line) and OHPL (green line) to modern labourers' cottage KO-04 (red circle). The cottage is approximately 25 m from the current roadway (red arrow) and will not be affected by the roadway upgrade, but the proposed OHPL appears to pass directly over the structure. Note also the location of the Platdorings farm complex (KO-05) approximately 100 m from the access road and OHPL.

• With respect to the **graves and burial grounds** identified in 2021-2022, these all lie outside the boundary of the Koup 2 WEF, in proximity to the access road and OHPL.

The final proposed access road and OHPL alignment are both at least 200 m from the formal graveyard (KO-07) and possible grave (KO-08) associated with the Kareerivier farm complex, and the informal graveyard (KO-06) possibly associated with the Platdoring complex and well beyond the 50 m buffer recommended around these sites in the HIA.

The informal graveyard (KO-06), however, is approximately 45 m from the roadway and while this is likely to be sufficient to ensure that it is not impacted by the access road, it means that the imposition of a 50 m buffer is not practical, and it is <u>recommended</u> that this is reduced to 40 m.

Regarding the OHPL and KO-06, the proposed final cable alignment shown on Figure 8 does not have pylons indicated at the points marked by the red stars on the figure. This suggests that the alignment of the cable may instead follow the most direct line between the two marked pylon locations. If this is the case, the OHPL will pass almost directly over the graves and the potential for impacts is high.

The single isolated grave, KO-09, is directly adjacent to the access road (Figure 9) and is very likely to be impacted by its upgrade for the WEF unless the road alignment is amended.



Figure 8: Location of informal graveyard KO-06 in relation to the Koup 1 and 2 access road (orange line) and OHPL (green line). The lack of pylon positions shown at the two red-starred points on the OHPL suggests that it will follow the line between the two marked pylons (red line) which means it will cross almost directly over the graveyard.



Figure 9: Location of grave KO-09 directly adjacent to current farm road / Koup 1 and 2 WEF access road.

6.3 2023 Walkdown Survey Results

The survey tracks and archaeological sites recorded during the 2023 walkdown survey are shown on Figure 10 and a list of the sites recorded is attached as Appendix 4.



Figure 10: 2023 walkdown survey waypoints (dots marked JG or G) overlaid on the final Koup 2 WEF layout (Source: Google Earth).

6.3.1 Archaeology

Nine archaeological lithic scatters were recorded, the bulk of which were MSA in age, some with occasional LSA lithics also present. One, more clearly LSA scatter was noted (JG021).

A number of these scatters were to ephemeral or influenced by erosion to be gradable and are not considered conservation-worthy (JG003, JG004, JG010, JG017, JG022).

The remaining four sites (JG018, JG019, JG021, G004) were graded 3C.

Of these, the most interesting is JG019, a dense, mainly MSA lithic scatter on an exposure of pedicrete underlain by the tuffite from which the lithics are mostly made. A couple of the larger pieces (possibly ESA?) are made on sandstone and 1 x hornfels piece was noted. The lithics show variable patination but all pieces are more or less patinated, consistent with their age. Flakes, numerous blades, chunks and cores were recorded, although blades are the dominant lithic form (Plate 3). The site occupies an area of at least 15 x 50 m, on a low

promontory overlooking the confluence of three streams and an area immediately below the site looks to remain wet for extended periods in an otherwise very dry landscape.



Plate 3: Example of the MSA lithics recorded at JG019. The two pieces at bottom right may be ESA (Photo: J Gribble).

Two stone features were recorded by ACO:

- JG002 is a roughly packed stone historical boundary marker approximately 65 m from WTG 41 (Plate 4) which was graded 3C.
- JG020 is a stone mound constructed predominantly of long thin sandstone blocks which are clearly intentionally laid (Plate 5). It is approximately 1.5 x 1.5 m in extent and could be a grave or a historical boundary marker. On the off chance that it is a grave the feature was graded 3A.



Plate 4: Historical stone boundary marker JG002 (left). Detail from the relevant 1:50,000 topographic map sheet showing a farm boundary (black line) very close to the position of JG002. (Photo: J Gribble / 1:50,000 chart 3222CD, National Geo-spatial Information, <u>http://www.ngi.gov.za</u>).



Plate 5: Stone mound JG020 (Photos: J Gribble).

6.3.1 Built Environment

Apart from the historical buildings previously recorded by PGS Heritage at Reynartskraal (KT-04) and KT-03, only one other building was recorded during the ACO walkdown.

This was a relatively modern, two-roomed labourers' cottage (JG005) with a corner hearth in one room. The structure is built of fired bricks with a hard mortar and hard plaster and steel-framed windows and is unlikely to be older than 60 years (Plate 6). It was graded NCW. The structure is located approximately 150 m south of the Koup2 O&M and laydown areas and will not be directly affected by either.



Plate 6: Front and rear elevations of the modern labourers' cottage JG005 (Photos: J Gribble).

6.3.2 Graves and Burials

A possible isolated grave (JG020) has been described above already.

Another possible isolated grave was recorded on a hillside approximately 140 m from the labourers' cottage JG005 and 30 m from the southern edge of the Koup 2 laydown area. The site, JG006, is a low stone mound roughly 1.8 x 1 m in extent (Plate 7). Given the possibility that it is a grave it was graded 3A.



Plate 7: Three views of the stone mound JG006 which may be a grave (Photos: J Gribble).

7 POTENTIAL IMPACTS AND RECOMMENDED MITIGATION MEASURES FOR INCLUSION IN THE EMPR

7.1 Archaeology

Four of the archaeological occurrences recorded by PGS Heritage in the 2022 (KT-06, KT-08, KT-10, KT-12) are likely to be impacted by the final layout of the Koup 2 WEF.

However, none of the archaeological material identified by PGS Heritage was assessed to be conservation worthy so impacts to these sites, should they occur, are not considered to be significant.

The walkdown survey undertaken in January 2023 confirmed the occurrence of further, mainly MSA with some LSA archaeological material in relatively low quantities and of relatively low significance within the WEF.

Five of the nine lithics scatters recorded by ACO (JG003, JG004, JG010, JG017, JG022) are not considered conservation worthy and should they be impacted by the WEF there will not be a significant loss to archaeology.

The remaining four sites were graded 3C (JG018, JG019, JG021, G004).

Of these sites, only G004 is located in close proximity to WEF infrastructure and it is <u>recommended</u> that a buffer of 20 m is implemented around this site, and that it is physically cordoned off during construction to ensure that the archaeological material is not damaged or disturbed.

The remaining three sites are sufficiently distant from any WEF infrastructure that in the normal course of construction activities they will not be subject to impact. However, these sites must be <u>avoided</u> by construction contractors and may not be disturbed or damaged and nothing may be removed from them.

The possibility exists that buried archaeological material will be exposed during earthworks for the WEF. All archaeological material over 100 years of age is protected and may only be disturbed or removed from its place of origin under a permit issued by HWC.

In the event of anything unusual being encountered, the project archaeologist and HWC must be notified and consulted immediately so that mitigatory action can be determined and be implemented, if necessary. Mitigation is at the cost of the developer, while time delays and diversion of machinery/plant may be necessary until mitigation in the form of conservation or archaeological sampling is completed.

Provided these mitigation measures are implemented, overall impacts to archaeological material arising from activities related to the construction, operation and decommissioning of the Koup 2 WEF will be <u>low</u>.

7.2 Built Environment

Of the four built structures recorded by PGS Heritage <u>within</u> the Koup 2 WEF footprint, their assessment was that the modern labourers' cottage (KT-01), the Glen farm complex (KT-02) and the historical Reynartskraal farmstead (KT-04) would not be impacted, and no mitigation was required.

Their assessment was that only the historical stone and brick cottage, KT-03, situated directly next to the access road would be impacted by the construction of the WEF and they <u>recommended</u> that a no-go-buffer-zone of at least 30 m is implemented around this building.

ACO's January 2023 walkdown survey confirmed the PGS Heritage assessment in respect of the modern labourers' cottage KT-01 and the Glen farm complex (KT-02) but found the following in respect of KT-03 and KT-04:

• The access road alignment in the final Koup 2 WEF layout plan appears to be unchanged from that assessed by PGS Heritage, and still goes directly past KT-03. As indicated in Figure 5 above, the 30 m buffer recommended by PGS <u>has not</u> been considered in planning the final alignment of the access road.

ACO <u>supports</u> the retention of the recommended buffer around this historical structure, which is very likely suffer to suffer adverse effects from the increased traffic and the passage of heavy vehicles the upgrade of this road to serve the WEF will occasion.

ACO recommends that the access road alignment near thus structure is:

- Shifted at least 30 m to the west, to respect the no-go buffer; or
- That the building is avoided using the alternative access road routing we suggest below with regard to the Reynartskraal farmstead (KT-04).
- ACO <u>does not agree</u> with the PGS Heritage assessment that there will be no impact to the Reynartskraal farmstead (KT-04) and that no mitigation is required.

This historical farmhouse and associated outbuilding are within 10 m of the existing farm road which is to be upgraded to serve as the WEF access road. The widening of the road, increased traffic, and the passage of heavy vehicles, especially during the construction of the WEF, are very likely to negatively affect these buildings.

ACO would, ordinarily recommend a no-go buffer around this historical complex, but the existing roadway here is sandwiched into an area less than 25 m wide between the buildings on one side and a deep river cutting on the other.

ACO therefore <u>recommends</u> that an alternative route for this section of the proposed WEF access road is sought, which will avoid both KT-04 and KT-03.

We <u>suggest</u> that a new section of access road is added to the internal road that will serve WTGs 47 and 50, planned just south of the Reynartskraal farmstead. This will route the WEF access road to the west and behind the KT-04 farmstead, to rejoin the current farm road / access road alignment somewhere between KT-03 and the start of the internal road that will serve the BESS, the onsite substation and a number of WTGs. Figure 11 attempts to show this proposal graphically. In drawing these route alternatives in the GIS, we noted the presence of a possible circular stone structure on the plateaux above the KT-04 farmstead (see Figure 11). If a new road is considered in this area, this feature must be avoided.

- ACO <u>notes</u> that the laydown and O&M areas for the Koup 2 WEF are approximately 85 m south of KT-04. These two areas are located on the top and far side of a low hill and will have no direct impact on the Reynartskraal buildings, but there is likely to be a visual impact, especially during the construction phase when the laydown area will be in use.
- Lastly, the final WEF layout meets the requirements of guidelines published by the Western Cape Provincial Government (2006) which recommend a minimum distance of at least 500 m between WTGs and buildings/structures older than 60 years. ACO can confirm that there are no WTGs located less than 850 m from any of the built structures described above.



Figure 11: Suggested alternative alignments for the WEF access road in the vicinity of KT-04 and KT-03 (dotted pale blue and purple lines) to replace the current portion of the access road (orange line) that passes very close to these historical buildings. A possible circular stone feature circled in yellow must be avoided if a roadway in this vicinity is planned.

In respect of the five built structures <u>outside</u> the WEF footprint but in proximity to the access road and OHPL the following applies:

- KO-01 is a modern labourers' cottage which is not conservation worthy. No mitigation is required although it will not be directly affected by the access road or OHPL.
- The access road and OHPL alignments shown in the final layout of the Koup 2 WEF are both outside the 30 m no-go buffers zones recommended by PGS Heritage around from the outer limits of the KO-03 / KO-02 (Kareerivier) and KO-05 (Platdorings) farmsteads. These farmsteads will thus not be subject to direct project-related impacts.
- The only other structures identified in the HIA is the modern labourers' cottage KO-04. This may be affected by the OHPL which on its current alignment passes almost directly over the building. While this is not a heritage issue, given the building's current age, it may be health / living environment issue if the cottage is still used.

Impacts to the built environment, both within the WEF and along the access road and OHPL, from activities related to the construction, operation and decommissioning of the Koup 2

WEF will be <u>low</u>, provided the mitigation measures recommended above are implemented.

7.3 Graves and Burials

PGS Heritage did not report any graves or burial grounds <u>within</u> the Koup 2 WEF but two possible, isolated graves were recorded by ACO during the 2023 walkdown survey.

- These (JG020 and JG006) have been described above and although it is possible that neither are graves, their form, and the location of JG006 in particular near to the labourers' cottage suggests that they could be. They have both thus been given a grading of 3A and <u>must</u> be avoided during the construction of the Koup 2 WEF. ACO recommends that a 50 m no-go buffer is implemented around both sites.
- It is further <u>recommended</u> that JG006, which lies within 30 m of the southern edge of the Koup 2 laydown area, is physically cordoned off during construction to ensure that it is not damaged or disturbed.

In respect of the four know or possible graveyards and/or graves <u>outside</u> the WEF footprint but in proximity to the access road and OHPL identified by PGS Heritage, the following can be stated:

- ACO's review of the final WEF layout of the Koup 2 WEF <u>confirms</u> that the proposed access road and OHPL are more than 200 m from the formal graveyard (KO-07) and possible grave (KO-08) associated with the Kareerivier farm complex and from the informal graveyard (KO-06) possibly associated with the Platdoring complex each of which PGS Heritage recommended should be buffered by 50 m. The recommendation of the HIA have thus been met and there will be no direct impacts to these graves and graveyards arising from the construction of the access road or OHPL.
- The informal graveyard (KO-06) is approximately 45 m from the roadway and while this is likely to be sufficient to ensure that it is not impacted by the upgrade and use of the access road, it does mean that the imposition of a 50 m buffer is not practical, ACO therefore <u>recommends</u> that this buffer is reduced to 40 m and that it is physically cordoned off during construction to ensure that the graves are not damaged or disturbed.

Also, regarding the OHPL and KO-06, the proposed final cable alignment shown on Figure 8 does not have pylons indicated at the points marked by the red stars on the figure. This suggests that the alignment of the cable may instead follow the most direct line between the two marked pylon locations. If this is the case, the OHPL will pass almost directly over the graves and the potential for impacts is high. It is recommended that the alignment of the OHPL in the vicinity of KO-06 follows that indicated in the final WEF layout to ensure that there are no impacts to this informal burial ground.

• Lastly, the single isolated grave, KO-09, is still directly adjacent to the access road and the 50 m buffer recommended by PGS <u>has not</u> been implemented. It is <u>recommended</u> that the proposed access road alignment is amended in the vicinity of KO-09 to ensure that the grave is not impacted. It is <u>suggested</u> that the 50 m buffer may be reduced to 20

m, but that should this occur, it must be a requirement that KO-09 is physically marked off during construction to ensure that grave is not damaged or disturbed.

If any of the identified graves need to be relocated because of the development of the WEF, a Grave Management Plan <u>must</u> be drafted and approved HWC, before graves are moved.

Unmarked, pre-colonial graves may occur within the WEF or along the access road or OHPL outside the WEF boundary, particularly along river courses and within valleys where there is soft soil suitable for interment. In the event that any human remains be disturbed, exposed or uncovered during excavations and earthworks for the WEF, work in the vicinity <u>must</u> cease immediately, the remains made secure and left in situ, and the project archaeologist and HWC notified so that a decision can be made about how to mitigate the find.

Provided the mitigation measures above are implemented, impacts to graves and burials from activities related to the construction, operation and decommissioning of the WEF and access road and OHPL will be <u>low</u>.

8 CONCLUSIONS

In terms of the acceptability of the proposed final Koup 2 WEF layout and access road and OHPL to heritage resources, although there remains some potential for impacts arising from the construction of the WEF, these impacts are not likely to be significant given the overall nature of archaeological resources in the area.

It is our reasoned opinion, therefore, that the final Koup 2 WEF layout has avoided and excluded most identified heritage resources and, provided the recommendations made and mitigation measures set out above are included in the EMPr and effectively implemented before and during construction, the final site layout plan is considered acceptable from a heritage perspective and development can proceed.

9 REFERENCES

Cape Archaeological Survey (CAS) cc and Associates. 2016. *Heritage Impact Assessment: Proposed Construction of Two Power Lines & Three Substations for the Mainstream Wind Energy Facility. Land Parcel Beaufort West, Remainder of Farm Trakaskuilen No 15, Portion 1 Trakaskuilen No 15, Portion 1 of Witpoortje No 16.* Unpublished report prepared for SiVEST Environmental Division. Cape Archaeological Survey. Cape Town.

Fourie, W. 2022. *Heritage Impact Assessment for the proposed construction of the Koup 2 Wind Energy Facility and Associated Grid Infrastructure, Near Beaufort West, Western Cape Province, South Africa*. Unpublished report produced for SiVEST SA (Pty) Ltd. Pretoria. PGS Heritage (Pty) Ltd.

Guelke, L. and Shell, R. 1992. Landscape of Conquest: Frontier water alienation and Khoikhoi strategies for survival, 1652 – 1780. *Journal of Southern African Studies* 18(4):803-824.

Mann, N. 2022b. Proposed Construction of the Koup 2 Wind Energy Facility and Associated Grid Infrastructure, near Beaufort West, Western Cape Province, South Africa: Archaeological Impact Assessment. Unpublished report produced for SiVEST SA (Pty) Ltd. Pretoria. PGS Heritage (Pty) Ltd.

PGS Heritage. 2019. Proposed construction of a linking station, two (2) power lines and two (2) on-site substations for the Beaufort West and Trakas Wind Farms, near Beaufort West in the Western Cape Province. Unpublished report prepared for SiVest. PGS Heritage. Pretoria.

Provincial Government of the Western Cape, 2006. *Strategic Initiative to Introduce Commercial Land Based Wind Energy Development in the Western Cape. Towards a Regional Methodology for wind energy site selection.* Dated May 2006.

Sampson, CG., Sampson, BE & Neville, D. 1994. An early Dutch Settlement pattern on the north east frontier of the Cape Colony. *Southern African Field Archaeology* 3: 74-81.

Webley, L. 2021. *Proposed Beaufort West Wind Farm 33kv / 132kv Substation, 132kv Powerline and Associated Infrastructure Projects*. Unpublished report prepared for 3Foxes Biodiversity Solutions. Lita Webley. Cape Town.

APPENDIX 1: SPECIALIST DECLARATION

(See separate PDF file)

APPENDIX 2: CURRICULUM VITAE – JOHN GRIBBLE

(Last updated - 12 January 2023)

Name:	John Gribble
Profession:	Archaeologist (Maritime)
Date of Birth:	15 November 1965
Parent Firm:	ACO Associates cc
Position in Firm:	Senior Archaeologist
Years with Firm:	5+
Years of experience:	33
Nationality:	South African
HDI Status:	n/a

Education:

1979-1983	Wynberg Boys' High School
1986	BA (Archaeology), University of Cape Town
1987	BA (Hons) (Archaeology), University of Cape Town
1990	Master of Arts, (Archaeology) University of Cape Town

Employment:

- September 2017 present: ACO Associates, Senior Archaeologist and Consultant
- 2014-2017: South African Heritage Resources Agency, Manager: Maritime and Underwater Cultural Heritage Unit
- 2012-2018: Sea Change Heritage Consultants Limited, Director
- 2011-2012: TUV SUD PMSS (Romsey, United Kingdom), Principal Consultant: Maritime Archaeology
- 2009-2011: EMU Limited (Southampton, United Kingdom), Principal Consultant: Maritime Archaeology
- 2005-2009: Wessex Archaeology (Salisbury, United Kingdom), Project Manager: Coastal and Marine
- 1996-2005: National Monuments Council / South African Heritage Resources Agency, Maritime Archaeologist
- 1994-1996: National Monuments Council, Professional Officer: Boland and West Coast, Western Cape Office

Professional Qualifications and Accreditation:

- Member: Association of Southern African Professional Archaeologists (ASAPA) (No. 043)
- Principal Investigator: Maritime and Colonial Archaeology, ASAPA CRM Section
- Field Director: Stone Age Archaeology, ASAPA CRM Section
- Class III Diver (Surface Supply), Department of Labour (South Africa) / UK (HSE III)

Experience:

I have more than 30 years of professional archaeological and heritage management experience. After completing my postgraduate studies and a period of freelance archaeological work in South Africa and aboard, I joined the National Monuments Council (NMC) (now the South African Heritage Resources Agency (SAHRA)) in 1994. In 1996 I become the NMC's first full-time maritime archaeologist and in this regulatory role was responsible for the management and protection of underwater cultural heritage in South Africa under the National Monuments Act, and subsequently under the National Heritage Resources Act.

In 2005 I moved to the UK to join Wessex Archaeology, one of the UK's biggest archaeological consultancies, as a project manager in its Coastal and Marine Section. In 2009 I joined Fugro EMU Limited, a marine geosurvey company to set up their maritime archaeological section. I then spent a year at TUV SUD PMSS, an international renewable energy consultancy, where I again provided maritime archaeological consultancy services to principally the offshore renewable and marine aggregate industries.

In August 2012 I established Sea Change Heritage Consultants Limited, a maritime archaeological consultancy. Sea Change traded until 2018, providing archaeological services to a range of UK maritime sectors, including marine aggregates and offshore renewable energy.

In the UK I was also involved in strategic projects which developed guidance and best practice for the UK offshore industry with respect to the marine historic environment. This included the principal authorship of two historic environment guidance documents for COWRIE and the UK renewable energy sector (*Historical Environment Guidance for the Offshore Renewable Energy Sector* (2007) and *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (2010)). I was also manager and lead author in the development of the archaeological elements of the first Regional Environmental Assessments for the UK marine aggregates industry, and in the 2009 UK Continental Shelf Offshore Oil and Gas and Wind Energy Strategic Environmental Assessment for Department of Energy and Climate Change. In 2013-14 I was lead author and project co-ordinator on *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom* and in 2016 I was co-author of a Historic England / Crown Estate / British Marine Aggregate Producers Association funded review of marine historic environment best practice guidance for the UK offshore aggregate industry.

I returned to South African in mid-2014 where I was re-appointed to my earlier post at SAHRA: Manager of the Maritime and Underwater Cultural Heritage Unit. In July 2016 I was appointed as Acting Manager of SAHRA's Archaeology, Palaeontology and Meteorites Unit.

I left SAHRA in September 2017 to join ACO Associates as Senior Archaeologist and Consultant. Since being at ACO I have carried out a wide range of terrestrial and maritime archaeological assessments, many of which are listed in the following section.

In 2018 of the potential impacts of marine mining on South Africa's palaeontological and archaeological heritage for the Council for Geoscience, on behalf of the Department of Mineral Resources.

I have been a member of the Association of Southern African Professional Archaeologists (No. 043) for more than thirty years and am accredited by ASAPA's Cultural Resource Management section.

I have been a member of the ICOMOS International Committee for Underwater Cultural Heritage since 2000 and served as a member of its Bureau between 2009 and 2018.

Since 2010 I have been a member of the UK's Joint Nautical Archaeology Policy Committee.

I am a member of the Advisory Board of the George Washington University / Iziko Museums of South Africa / South African Heritage Resources Agency / Smithsonian Institution 'Southern African Slave Wrecks Project'.

I have served on the Heritage Western Cape Archaeology, Palaeontology and Meteorites Committee since 2014.

Selected Project Reports:

- Gribble, J. 2017. *Archaeological Assessment of Farm No 8/851, Drakenstein*. Unpublished report prepared for Balwin Properties Pty Ltd. ACO Associates.
- Gribble, J. 2017. *Archaeological Assessment of Bosjes Phase 2, Farm 218 Witzenberg*. Unpublished report prepared for Farmprops 53 (Pty) Ltd. ACO Associates.
- Gribble, J. 2017. *Canal Precinct, V&A Waterfront: Heritage Impact Assessment.* Unpublished report prepared for Nicolas Baumann Urban Conservation and Planning. ACO Associates.
- Gribble, J. 2017. Archaeological Assessment of the proposed dam on the farm Constantia Uitsig, Erven 13029 and 13030, Cape Town. Unpublished report prepared for SLR Consulting (South Africa) (Pty) Ltd). ACO Associates.

- Gribble, J. 2017. *Archaeological Assessment of Erf* 4722 *Blouvlei, Wellington.* Unpublished report prepared for Urban Dynamics Western Cape (Pty) Ltd. ACO Associates.
- Hart, T.G., Gribble, J. & Robinson, J. 2017 *Heritage Impact Assessment for the Proposed Phezukomoya Wind Energy Facility to be Situated in the Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Hart, T.G., Gribble, J. & Robinson, J. 2017 *Heritage Impact Assessment for the Proposed San Kraal Wind Energy Facility to be Situated in the Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. 2018. Integrated Heritage Impact Assessment of the Peter Falke Winery on Farm 1558 Groenvlei, Stellenbosch. Unpublished report prepared for Werner Nel Environmental Consulting Services. ACO Associates.
- Gribble, J. & Halkett, D. 2018. *Heritage Impact Assessment for a Proposed Extension of the Kaolin Mine on Portion 1 of the Farm Rondawel 638, Namaqualand District, Northern Cape*. Unpublished report prepared for Rondawel Kaolien (Pty) Ltd. ACO Associates.
- Gribble, J. 2019. Archaeological Impact Assessment for Proposed Sand Mining on Portion 2 of Farm Kleinfontein 312, Klawer District, Western Cape. Unpublished report prepared for Green Direction Sustainability Consulting (Pty) Ltd. ACO Associates.
- Halkett, D. & Gribble, J. 2018. Archaeological/Heritage Report for the Expansion of the Current Granite Mining at Oeranoep and Ghaams, Northern Cape Province. Unpublished report prepared for Klaas Van Zyl. ACO Associates.
- Gribble, J. 2018. *Potential Impacts of Marine Mining on South Africa's Palaeontological and Archaeological Heritage*. Report prepared for Council for Geoscience. ACO Associates.
- Gribble, J. 2018. *Maritime Heritage Impact Assessment: Block ER236, Proposed Exploration Well Drilling*. Unpublished report prepared for ERM Southern Africa (Pty) Ltd. ACO Associates.
- Gribble, J. 2018. *Maritime Heritage Impact Assessment: IOX Cable Route*. Unpublished report prepared for ERM Southern Africa. ACO Associates.
- Gribble, J. 2018. *Archaeological Assessment of the Terrestrial Portion of the IOX Cable Route*. Unpublished report prepared for ERM Southern Africa. ACO Associates.
- Gribble, J. 2018. Archaeological Assessment: Erven 11122, 11123, 11124, 11125, 11126, 11127 and Re 11128, Corner Frere Street and Albert Road, Woodstock, Cape Town. Unpublished report prepared for Johan Cornelius. ACO Associates.
- Gribble, J. 2018. *Maritime Heritage Impact Assessment: Expansion of Diamond Coast Aquaculture Farm on Farm 654, Portion 1, Kleinzee, Northern Cape.* Unpublished report prepared for ACRM. ACO Associates.
- Gribble, J. 2018. *Heritage Impact Assessment: Ship Repair Facility, Port of Mossel Bay.* Unpublished report prepared for Nemai Consulting. ACO Associates.
- Gribble, J. 2018. Archaeological Assessment: Sites B and C, Portswood Ridge Precinct, V&A Waterfront. Unpublished report prepared for Urban Conservation. ACO Associates.

- Gribble, J. 2018. *Heritage Impact Assessment: Zandrug, Farm Re 9/122, Cederberg.* Unpublished report prepared for Cederberg Environmental Assessment Practice. ACO Associates.
- Gribble, J. and Hart, T.G. 2018. *Initial Assessment Report and Motivation for Exploratory Permit, Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown*. Unpublished report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.
- Gribble, J. and Hart, T.G. 2018. Initial investigation report with respect to human remains found at Erf 4995, corner of Waterfall and Palace Hill Roads, Simonstown.
 Unpublished permit report prepared for Regent Blue Sayers' Lane (Pty) Ltd. ACO Associates.
- Gribble, J. 2019. *Maritime Heritage Impact Assessment: ASN Africa METISS Subsea Fibre Optic Cable System*. Unpublished report prepared for ERM Southern Africa. ACO Associates.
- Gribble, J. 2019. *Maritime Archaeological Impact Assessment of Proposed Aquaculture Areas 1, 6 And 7, Algoa Bay, Eastern Cape Province*. Unpublished report prepared for Anchor Research & Monitoring (Pty) Ltd. ACO Associates.
- Gribble, J. 2019. *Heritage Impact Assessment: Rooilandia Farm Dam, Pipeline and New Irrigation Areas*. Unpublished report prepared for Cornerstone Environmental Consultants. ACO Associates.
- Gribble, J. 2019. *Maritime Archaeological Impact Assessment of Proposed Equiano Cable System, landing at Melkbosstrand, Western Cape Province*. Unpublished report prepared for Acer (Africa) Environmental Consultants. ACO Associates.
- Gribble, J. 2019. *Heritage Baseline for Prospecting Right Applications: Sea Concession Areas 14b, 15b and 17b, West Coast, Western Cape Province*. Unpublished report prepared for SLR Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Archaeological Amendment Report: San Kraal Wind Energy Facility, Noupoort, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. Archaeological Amendment Report: Phezukomoya Wind Energy Facility, Noupoort, Northern Cape. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. *Archaeological Amendment Report: Hartebeeshoek West Wind Energy Facility, Noupoort, Northern Cape*. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. Archaeological Amendment Report: Hartebeeshoek East Wind Energy Facility, Noupoort, Northern Cape. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2019. Heritage Assessment: Infrastructure Associated with the San Kraal, Phezukomoya and Hartebeeshoek East and West Wind Energy Facilities, Noupoort, Northern Cape. Unpublished report prepared for Arcus Consulting. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2020. Heritage Impact Assessment: Proposed Grid

Connection for the De Aar 2 South Wind Energy Facility, De Aar, Northern Cape. Unpublished report prepared for Arcus Consulting. ACO Associates.

- Gribble, J., Euston-Brown, G.L. & Hart, T. 2020. Heritage Impact Assessment: Proposed Construction of Five Guest Cottages on the Farm Groenfontein (Farm 96), Outside Ceres, Western Cape. Unpublished report prepared for Doug Jeffery Environmental Consultants. ACO Associates.
- Gribble, J. 2020. *Maritime Archaeological Impact Assessment for Prospecting Rights Applications: Sea Concession Areas 14b, 15b and 17b, West Coast, Western Cape Province*. Unpublished report prepared for SLR Consulting. ACO Associates.
- Gribble, J. 2020. *Maritime Archaeological Impact Assessment for Prospecting Rights Applications: Sea Concession Areas 13C and 15C - 18C, West Coast, Western Cape Province*. Unpublished report prepared for SLR Consulting. ACO Associates.
- Gribble, J. 2020. *Heritage Impact Assessment for Proposed Sand Mining on Portion 2 Of Farm Kleinfontein 312, Klawer District, Western Cape*. Unpublished report prepared for Green Direction Sustainability Consulting (Pty) Ltd. ACO Associates.
- Gribble, J. 2020. Archaeological Assessment: Erven 10712 and Re 14932, Corner Railway Street and Albert Road, Woodstock, Cape Town. Unpublished report prepared for Claire Abrahamse. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2020. *Heritage Impact Assessment: Leliefontein to Conmarine Bulk Water Pipeline, between Paarl and Wellington*. Unpublished report prepared for Aurecon South Africa (Pty) Ltd. ACO Associates.
- Gribble, J. & Euston-Brown, G.L. 2020. *Heritage Impact Assessment: Proposed Expansion of the Sand Mine on Portion 4 of The Farm Zandbergfontein, Robertson, Western Cape*. Unpublished report prepared for Greenmined Environmental. ACO Associates.
- Gribble, J. 2021. Maritime Archaeological Impact Assessment of Proposed 2AFRICA/GERA (East) Submarine Fibre Optic Cable System, Landing at Duynefontein, Western Cape Province. Unpublished report prepared for Acer (Africa) Environmental Consultants. ACO Associates.
- Gribble, J. 2021. Maritime Archaeological Impact Assessment of Proposed 2AFRICA/GERA (West) Submarine Fibre Optic Cable System, Landing at Yzerfontein, Western Cape Province. Unpublished report prepared for Acer (Africa) Environmental Consultants. ACO Associates.
- Gribble, J. 2021. *Heritage Impact Assessment: Beaufort West Photovoltaic Project, outside Beaufort West, Western Cape*. Unpublished report prepared for Nemai Consulting (Pty) Ltd. ACO Associates.
- Gribble, J. 2021. Heritage Impact Assessment: Proposed Esizayo 132KV Transmission Integration Project, on Farms Standvastigheid 210 Remainder and Aurora 285, Western and Northern Cape. Unpublished report prepared for WSP Group Africa (Pty) Ltd. ACO Associates.
- Gribble, J. 2022. Heritage Impact Assessment: Proposed Oceana 10 MW Solar Photovoltaic Facility, on Portion 4 of Farm 6 Duyker Eiland, St Helena Bay, Western Cape. Unpublished report prepared for SRK Consulting (South Africa) (Pty) Ltd. ACO Associates.

Gribble, J. & Euston-Brown, G. 2021. Heritage Impact Assessment: Proposed Photovoltaic Facility on Remainder of Farm Vaal Rivier 261, Farm Vaal Kloof 262, Portion 1 of Farm Jurgens Fontein 263, Portion 2 of Farm Kolkies Rivier 234 and Portion 1 of Farm Eiberg West 260, East of Ceres, Western Cape. Unpublished report prepared for Ecocompliance. ACO Associates.

Publications:

- Gribble, J. and Scott, G., 2017, *We Die Like Brothers: The sinking of the SS Mendi*, Historic England, Swindon.
- Sharfman, J., Boshoff, J. and Gribble, J. 2017. Benefits, Burdens, and Opportunities in South Africa: The Implications of Ratifying the 2001 UNESCO Convention on the Protection of Underwater Cultural Heritage, in L. Harris (ed) Sea Ports and Sea Power: African Maritime Cultural Landscapes, Springer International Publishing, Switzerland, pp 101-110.
- Lloyd Jones, D., Langman, R., Reach, I., Gribble, J., and Griffiths, N., 2016, Using Multibeam and Sidescan Sonar to Monitor Aggregate Dredging, in C.W. Finkl and C. Makowski (eds) Seafloor Mapping along Continental Shelves: Research and Techniques for Visualizing Benthic Environments, Coastal Research Library 13, Springer International Publishing, Switzerland, pp 245-259.
- Athiros, G. and Gribble, J., 2015, *Wrecked at the Cape Part 2*, The Cape Odyssey 105, Historical Media, Cape Town.
- Gribble, J. and Sharfman, J., 2015, The wreck of SS Mendi (1917) as an example of the potential trans-national significance of World War I underwater cultural heritage, *Proceedings of the UNESCO Scientific Conference on the Underwater Cultural Heritage from World War I*, Bruges, 26-28 June 2014.
- Gribble, J., 2015, Underwater Cultural Heritage and International Law. Cambridge by Sarah Dromgoole, in *South African Archaeological Bulletin*, 70, 202, pp 226-227.
- Athiros, G. and Gribble, J., 2014, *Wrecked at the Cape Part 1*, The Cape Odyssey 104, Historical Media, Cape Town.
- Gribble, J., 2014, Learning the Hard Way: Two South African Examples of Issues Related to Port Construction and Archaeology, in Dredging and Port Construction: Interactions with Features of Archaeological or Heritage Interest, *PIANC Guidance Document 124*, pp 97-107.
- UK UNESCO 2001 Convention Review Group, 2014, *The UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001: An Impact Review for the United Kingdom*, ISBN 978-0-904608-03-8.
- Sadr, K., Gribble, J. and Euston-Brown, G, 2013, Archaeological survey on the Vredenburg Peninsula, in Jerardino et al. (eds), *The Archaeology of the West Coast of South Africa*, BAR International Series 2526, pp 50-67.
- Gribble, J. and Sharfman, J. 2013, Maritime Legal Management in South Africa, *Online Encyclopaedia of Global Archaeology*, pp 6802-6810.
- Gribble, J., 2011, The UNESCO Convention on the Protection of the Underwater Cultural

Heritage 2001, Journal of Maritime Archaeology 6:1 77-86.

- Gribble, J., 2011, The SS Mendi, the Foreign Labour Corps and the trans-national significance of shipwrecks, in J. Henderson (ed.): *Beyond Boundaries, Proceedings of IKUWA 3, The 3rd International Congress on Underwater Archaeology*, Römisch-Germanische Kommission (RGK), Frankfurt.
- Gribble, J., 2011, Competence and Qualifications, in Guèrin, U., Egger, B. and Maarleveld,
 T. (eds) UNESCO Manual for Activities directed at Underwater Cultural Heritage,
 UNESCO Secretariat of the 2001 Convention, Paris.
- Gribble, J. and Leather, S. for EMU Ltd., 2010, Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector. Commissioned by COWRIE Ltd (Project reference GEOARCH-09).
- Sadr, K and Gribble, J., 2010, The stone artefacts from the Vredenburg Peninsula archaeological survey, west coast of South Africa, *Southern African Humanities* 22: 19–88.
- Gribble, J., 2009, HMS Birkenhead and the British warship wrecks in South African waters in *Proceedings of the Shared Heritage Seminar*, University of Wolverhampton, 8 July 2008.
- Gribble, J., Parham, D. and Scott-Ireton, D., 2009, Historic Wrecks: Risks or Resources? In *Conservation and Management of Archaeological Sites*, Vol. 11 No. 1, March, 2009, 16–28.
- Gribble, J. and Athiros, G., 2008, *Tales of Shipwrecks at the Cape of Storms*, Historical Media, Cape Town.
- Gribble, J., 2008, The shocking story of the ss Mendi, in *British Archaeology*, March/April 2008.
- Gribble, J., 2007, The Protection of the Underwater Cultural Heritage: National Perspectives in light of the UNESCO Convention 2001 by Sarah Dromgoole, in *The International Journal of Nautical Archaeology*, 36, 1, pp 195-6.
- Gribble, J., 2006, The Sad Case of the ss Maori, in Grenier, R., D. Nutley and I. Cochran (eds) *Underwater Cultural Heritage at Risk: Managing Natural and Human Impacts*, pp 41-43, ICOMOS, Paris.
- Gribble, J., 2006, Pre-Colonial Fish Traps on the South Western Cape Coast, South Africa, in Grenier, R., D. Nutley and I. Cochran (eds) *Underwater Cultural Heritage at Risk: Managing Natural and Human Impacts*, pp 29-31, ICOMOS, Paris.
- Forrest, C.S.J., and Gribble, J., 2006, The illicit movement of underwater cultural heritage: The case of the Dodington coins, in *Art and Cultural Heritage: Law, Policy and Practice*, (ed B.T. Hoffman), New York, Cambridge University Press.
- Forrest, C.S.J., and Gribble, J., 2006, Perspectives from the Southern Hemisphere: Australia and South Africa, in *The UNESCO Convention for the Protection of the Underwater Heritage: Proceedings of the Burlington House Seminar*, October 2005, JNAPC / NAS.
- Gribble, J., 2003, "Building with Mud" Developing historical building skills in the Karoo, in ICOMOS South Africa, in *The Proceedings of Symposium on Understanding and using urban heritage in the Karoo*, Victoria West, South Africa, 3-5 March 2002.

- Forrest, C.S.J., and Gribble, J., 2002, The illicit movement of underwater cultural heritage: The case of the Dodington coins, *International Journal of Cultural Property*, Vol II (2002) No 2, pp 267-293.
- Gribble, J. 2002, The Past, Present and Future of Maritime Archaeology in South Africa, *International Handbook of Underwater Archaeology* (eds Ruppe and Barstad), New York, Plenum Press.
- Thackeray, F. and Gribble, J., 2001, Historical Note on an Attempt to Salvage Iron from a Shipwreck, *Looking Back*, Vol 40, November 2001, pp 5-7.
- Gribble, J., 1998, Keeping Our Heads Above Water the development of shipwreck management strategies in South Africa, *AIMA Bulletin*, Vol 22, pp 119-124.
- Gribble, J. 1996, Conservation Practice for Historical Shipwrecks, Monuments and Sites of South Africa, Colombo, Sri Lanka, ICOMOS 11th General Assembly.
- Gribble, J. 1996, National Databases on Monuments and Sites, Monuments and Sites of South Africa, Colombo, Sri Lanka, ICOMOS 11th General Assembly.
- Sadr, K, Gribble, J, & Euston-Brown, G L, 1992 The Vredenburg Peninsula survey, 1991/1992 season, Guide to Archaeological Sites in the South-western Cape, Papers compiled for the South African Association of Archaeologists Conference, July 1992, by A.B. Smith & B. Mutti, pp 41-42.
- Smith, AB, Sadr, K, Gribble, J, & Yates, R., 1992 Witklip and Posberg Reserve, *Guide to Archaeological Sites in the South-western Cape*, Papers compiled for the South African Association of Archaeologists Conference, July 1992, by A.B. Smith & B. Mutti, pp 31-40.
- Smith, AB, Sadr, K, Gribble, J & Yates, R., 1991, Excavations in the south-western Cape, South Africa, and the archaeological identity of prehistoric hunter-gatherers within the last 2000 years, *The South African Archaeological Bulletin* 46: 71-91.
APPENDIX 3: LIST OF HERITAGE SITES RECORDED IN 2020-2021 ARCHAEOLOGICAL SURVEY

Name	Location	Description	
KT-01	-32.840389000 22.416399000	Fenced-off brick structure with a parking area approximately 150 m south of the main farm road. The construction materials and technique are consistent with modern building methods. No other cultural material was identified around the site. The structure was not depicted at this locality on the 3222CD topographical sheet dating to 1965 and is thus younger than 60 years. The site is rated as NCW. Extent : 12 m x 5 m. Recommendation : As KT-01 is located outside of the proposed development area, no mitigation is required, as no impact is expected.	
KT-02	-32.837688000 22.415422000	This site is the Glen Farmstead which comprises two main buildings and other associated farm structures. It is located approximately 230 m north of the main farm road and does not fall within the proposed development area. The structure is depicted on the 3222CD topographical sheet dating to 1965 and is therefore older than 60 years. The site is rated 3B with medium heritage significance. Recommendation : As KT-02 is located outside of the proposed development area, no mitigation is required, as no impact is expected.	IIIB
KT-03	-32.843851000 22.435412000	The site comprises a partially white-washed stone building. It is directly adjacent to the main farm road. The materials used in the construction are a mix of local dressed stone and modern brick, which suggests modification and additions through time. There is also refuse (glass, tin, porcelain) scattered around the site. A structure is not depicted at this locality on the 3222CD topographical sheet dating to 1965 but the building style and materials suggest that the structure is older than 60 years. The site is rated as IIIB with medium heritage significance. Extent : 14 m x 22 m. Recommendation : a) It is recommended that a no-go-buffer-zone of at least 30m is kept to the closest WEF infrastructure. b) If development occurs within 30 m of KT-03, the structure will need to be satisfactorily studied and recorded before impact occurs. c) Recording of the structure i.e. (a) map indicating the position and footprint of the structure (b) photographic recording of the structure (c) measured drawings of the floor plans of the structure.	IIIB

KT-04	-32.846026000 22.435429000	The site comprises a main structure and an associated outbuilding both located immediately adjacent to the main farm road. The construction materials and technique are consistent with modern building methods. No other cultural material was identified around the site. Reynartskraal is the only place name on the Koup project site that is clearly a significant place by the early 20th century which lends historical significance to this site. As a historical farmstead and significant element in the Bloemendal - Reynartskraal Poort gateway, this farmstead is graded IIIA. Extent : 10 x 14 m and 6 x 6 m. Recommendation : As KT-04 is not located within the immediate vicinity of the proposed development area. No mitigation is required.	IIIA
KO-01	-32.860144° 22.457773°	A brick labourers' house located immediately adjacent to the main farm road. The construction materials and technique are consistent with modern building methods. There was also rubbish scattered around the site. The structure was not depicted at this locality on the 3222CD topographical sheet dating to 1965 but was instead depicted on the 1987 topographical sheet. The site is therefore younger than 60 years. As no additional information was available, the site is provisionally rated as NCW as it has no research potential or is of other cultural significance. Extent:7 m x 4 m Recommendation: Located approximately 100 m from to an existing farm road so unlikely that it will be impacted. No mitigation required.	NCW
KO-02	-32.862803° 22.457924°	The ruin of a stone-packed and mud brick structure. There are the remains of stone walling and wooden roof support beams. Located approximately 180 m from the main farm road. There is other building materials and rubbish dumped around the site. A structure is depicted near this locality on the 3222CD topographical sheet dating to 1965. The site is therefore older than 56 years. As no additional information was available, the site is provisionally rated as IIIC with low heritage significance. Extent:10 m x 5 m Recommendation: Located approximately 150 m from the existing farm road, it is unlikely that it will be impacted.	IIIC
KO-03	-32.862867° 22.458450°	The site comprises a stone house and modern kraal situated on the eastern side of the property and other farm infrastructure. The site is located approximately 30m west of KO-02. A number of structures were identified at this locality on the 3222CD topographical sheet dating to 1965. The site is therefore older than 56 years. As no additional information was available, the site is provisionally rated as IIIB with medium heritage significance. Extent: 12 m x 7 m Recommendation: It is recommended that a no-go-buffer-zone of at least 30 m from the outer permitter of the farmstead (which is currently occupied) is kept to the closest WEF infrastructure (including turbines, substation facilities and roads). If development occurs within 30m of KO-03 the main house will need to be satisfactorily studied and recorded before impact occurs.	IIIB

		Recording of the buildings i.e. (a) map indicating the position and footprint of all the buildings and structures (b) photographic recording of all the buildings and structures (c) measured drawings of the floor plans of the principal buildings.	
KO-04	-32.856379° 22.471279°	Brick labourers' house and outhouse immediately adjacent to the main farm road and Platdorings farmstead (KO-05). The construction materials and technique are consistent with modern building methods. Access to the property was not possible, so an approximate size of the site was calculated. No other cultural material was identified around the site. The structure was only depicted at this locality on the 3222CD topographical sheet dating to 2005. The site is therefore younger than 60 years. As no additional information was available, the site is provisionally rated as NCW as it has no research potential or is of other cultural significance. Extent:4 m x 7 m Recommendation: As KO-04 is located within the immediate vicinity of an existing farm road, it is possible that it will be impacted if the road is expanded. No mitigation is required.	NCW
KO-05	-32.855620° 22.471717°	Platdorings farmstead consisting of four buildings and associated farm structures. Part of the farmstead falls within the proposed development area. Access to the property was not possible, so it was not possible to thoroughly assess the site. The main house is most probably the newest addition to the farmstead, with the smaller stone built flat roof structures part of the original farmstead that is older than 60 years. A farmstead is depicted at this locality on the 3222CD topographical sheet dating to 1965. The site is therefore older than 56 years. As no additional information was available, the site is provisionally rated as IIIB with medium heritage significance. Extent:120 m x 130 m Recommendation: KO-05 is located adjacent farm road. Therefore, it is recommended that a no-gobuffer-zone of at least 30 m from the outer permitter of the farmstead (which is currently occupied) is kept to the closest WEF infrastructure (including turbines, substation facilities and roads).	IIIB
KO-06	-32.856898° 22.471120°	Informal burial ground with four stone-packed graves. The site is situated approximately 80 m from an intersection of farm roads. Recommendation: The site should be demarcated with a 50 m buffer and the graves should be avoided and left in situ. A Grave Management Plan should be developed for the graves which also needs to be approved by HWC, if graves are to be relocated. If the site is going to be impacted and the graves need to be removed, a grave relocation process for site KO-06 is recommended as a mitigation and management measure.	IIIA

KO-07	-32.863574° 22.459759°	Graves of the Bothma family located on the eastern side of an ephemeral stream, approximately 140 m south-east of KO-03. Formal burial ground with four graves with headstones and granite grave. Fenced. Recommendation: The site should be demarcated with a 50 m buffer and the graves should be avoided and left in situ. A Grave Management Plan should be developed for the graves which also needs to be approved by HWC, if graves are to be relocated. If the site is going to be impacted and the graves need to be removed, a grave relocation process for site KO-07 is recommended as a mitigation and management measure.	IIIA
KO-08	-32.863077° 22.458603°	Possible grave situated adjacent to the stone house KO-03 on the western side of the property. Indicated by stacked stones. Recommendation: The site should be demarcated with a 50-meter buffer and the grave should be avoided and left in situ. A Grave Management Plan should be developed for the grave which also needs to be approved by HWC, if graves are to be relocated. If the site is going to be impacted and the grave needs to be removed, a grave relocation process for site KO-08 is recommended as a mitigation and management measure.	IIIA
KO-09	-32.868100° 22.484592°	Possible grave situated adjacent to a farm road. Indicated by a number of rocks placed at the head and foot of a section of ground. Recommendation: The site should be demarcated with a 50 m buffer and the grave should be avoided and left in situ. A Grave Management Plan should be developed for the grave which also needs to be approved by HWC, if graves are to be relocated.	IIIA
KT-05	-32.819910000 22.371110000	Low density MSA scatter	NCW
KT-06	-32.822824000 22.375017000	Low density MSA scatter	NCW
KT-07	-32.846609000 22.413293000	Low density MSA scatter	NCW
KT-08	-32.858072000 22.419377000	Low density MSA scatter	NCW
KT-09	-32.856236000 22.418802000	Low density ESA and MSA scatter	NCW
KT-10	-32.864656000 22.402861000	Low density MSA scatter	

KT-11	-32.848759000 22.427563000	Low density MSA scatter	NCW
KT-12	-32.847320000 22.432496000	Low density ESA, MSA and LSA scatter	NCW

APPENDIX 4: LIST OF HERITAGE SITES RECORDED IN 2022 ARCHAEOLOGICAL WALKDOWN SURVEY

Name	me Location Description		Grading	
JG001	-32.843823982 22.435407965	Previously recorded as KT-03. Historical farmhouse. Lower courses of slate, upper courses of brick. Whitewashed. Wooden casements on front. Steel windows on sides. Chimney at rear. Stone shed addition to rear of building. Midden on slope below - visible material was 20th century. Road passes directly to the west of		
	22.100101000	the building.		
10002	-32.841930008	Reughly packed stopp boundary marker in provimity to WTC 41	30	
30002	22.375667039		50	
10000	-32.834569020			
JG003	22 379806023	2 x sandstone flakes. Likely MSA. Clearly different to the shattered stone surrounding	Ungradable	
	-32.829645993			
JG004	22.376387967	Isolated sandstone flake. MSA/LSA?	Ungradable	
	-32.849202985	Relatively modern labourers' house 2 x rooms. Corner hearth. Constructed of fired bricks and hard mortar and		
JG005	22.435218031	plaster. Steel-framed windows. Older wooden door. Unlikely to be older than 60 years	NCW	
	-32.848300003			
JG006	22.434146991	Stone mound roughly 1.8 x 1 m in extent. Possible grave?	3A	
10040	-32.827421017	MSA lithic scatter on low rocky ridge. Made on greenish tuff. Includes some cores. Small area = approximately		
JG010	22,377177039	10 m2. Less than 1 piece per m ^{2.} Overlooks small stream. Lithics weathering out of the coversands	Ungradable	
	-32.862843024			
JG017	00 400057074	Isolated core on tuff. MSA. Patinated.		
	22.403957974			
JG018	22.388002016	Dense scatter of mixed MSA and LSA lithics made on tuff. Mainly MSA. The MSA lithics are heavily patinated red while the LSA material is generally fresher. The lithics are in a dense scree of raw material on a shallow slope. Appear to be present over at least 50 m ² with up to 10 or more pieces per m ²		
-		Lithic scatter among exposure of pedicrete. MSA with some later LSA pieces also present. Mostly made on tuff		
	-32.854309995	but a couple of the larger pieces (possibly ESA?) made on sandstone and 1 x hornfels piece noted. Variable		
JG019	22.378137019	patination but all pieces are more or less patinated. Flakes, numerous blades, chunks and cores. At least 15 x 50 m in extent. 2-3 pieces per m ² . Blades are the dominant lithic form. Situated on a low promontory overlooking the	3C	
		confluence of three streams. Area below looks to remain wet for extended periods.		
10020	-32.847916028	Stone mound. Made predominantly of long thin sandstone blocks which are clearly intentionally laid.	34	
30020	22.380322013	Approximately 1.5 x 1.5 m in extent. Grave? Boundary marker?		
	-32.853720998	LSA lithic scatter on edge of calcretized patch near a river edge. Above same stream as JG019. Consists mainly		
JG021	22.377123982	of chunks and cores and some flaked torpedo-shaped sandstone cobbles. Otherwise made on tuff and 1 x some sort of indurated siltstone. Some OES noted. Covers approximately 30 m ² . Very few flakes present.	3C	

JG022	-32.837459 22.381271	Biface made on tuff. Recorded by John Almond (Waypoint 6844a)	
G004	-32.847757023	A site in a shallow bowl with a small drainage. Big MSA flakes and a reddish banded wacke. In area of	30
0004	22.394131031	approximately 50 x 30 m with about 12 pieces per m ² at its most dense. Likely MSA. One large core noted.	

KOUP WIND ENERGY FACILTIES, WESTER CAPE PROVINCE

AQUATIC WALKDOWN REPORT

FOR

ERM (Pty) Ltd

BY



EnviroSci (Pty) Ltd

Dr Brian Colloty

1 Rossini Rd Pari Park Gqeberha 6070

DATE

28 January 2024

REVISION 1

Table of contents

1.	INTRODUCTION	4
2.	RESULTS	6
3.	CONCLUSIONS AND RECOMMENDATIONS	12
4.	APPENDIX 1 – SPECIALIST CV	13

LIST OF TABLES

Table 1: Findings of the walkdown surveys for the structures shown in Figure 2, 3 and 4 with specif	ic
reference to habitats observed within the development layout only	8

LIST OF FIGURES

Figure 1: The proposed project layout used in the walk down assessment conducted in 2022/20	23,
with the new internal roads and MV grid connections shown	5

LIST OF PHOTO PLATES

Plate 1: All of the indicated wetland crossings, such as this example will make use of some form c	٥f
impact area to cross and any works should be aligned with this disturbed areas. Wetland area withi	n
red circle	7
Plate 2: Impofu West - road crossing (cables) near Rosenhof, that should be aligned within the	S
disturbed area to avoid any of the protected trees observed	7

SPECIALIST REPORT DETAILS

Report prepared by: Dr. Brian Colloty Pr.Sci.Nat. (Ecology) / Member SAEIES.

Expertise / Field of Study: BSc (Hons) Zoology, MSc Botany, Ph.D Botany Conservation Importance rating and interior wetland / riverine assessment consultant from 1996 to present. Brian has also been working in the study region for the last 10 years, with respect to various renewable projects in the greater region as well as mining and road upgrade related projects.

I, **Dr. Brian Michael Colloty** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs and or Department of Water and Sanitation.

Billy

Signed:...

..... Date:...28 February 2024......

Appendix 1 of this report contains a detailed CV

This document contains intellectual property and proprietary information that is protected by copyright in favour of EnviroSci (Pty) Ltd. The document may therefore not be reproduced, or used without the prior written consent of EnviroSci (Pty) Ltd. This document is prepared exclusively for ERM (Pty) Ltd and their client and is subject to all confidentiality, copyright, trade secrets, and intellectual property law and practices of SOUTH AFRICA.

1. INTRODUCTION

ERM (Pty) Ltd appointed EnviroSci (Pty) Ltd to conduct the pre-commencement walkdown of the Koup Wind Energy Facilities (Figure 1). The authorised WEFs are located south-west of Beaufort West in the Western Cape Province.

This assessment was based on a 2-day walkdown (20-21 January 2024) of the current site layout provided, in December 2024. The aim of which, to confirm any sensitive <u>aquatic ecological</u> features, that may be affected by the revised layouts and provide the engineering team with additional information to further avoid and or reduce the potential impacts on the aquatic environment.

Further, the layout/alignment may also be adjusted based on additional input provided by the Terrestrial, Bat, Avifaunal and Heritage specialists and this report should be read in conjunction with those reports to contextualise the overall constraints provided to the development team.

1.1 Aims and objectives

- Conduct a pre-commencement ecological (aquatic) walk-through survey / assessment of the development areas:
 - Provide a professional opinion on ecological issues relating to the aquatic environment within the footprint areas to optimise the layout;
 - Report on the presence of potential wetlands that could be affected and where the relevant mitigation measures need to be implemented if needed;
 - Serve as additional ecological information for the Proponent, contractors and Environmental Control Officers (ECOs) and/or Environmental Officers (EOs) involved in the development, i.e. demarcated no-go areas before construction starts.
- This is also to facilitate micro-siting of footprint areas, where possible and by taking cognisance of other constraints, with the aim to further reduce negative impacts of the development.
- Aid in future decisions and environmental management regarding the project.

1.2 Assumptions and Limitation

To obtain a comprehensive understanding of the dynamics of both the flora and fauna of the aquatic communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. No long-term monitoring was undertaken as part of this assessment. However, a concerted effort was made to assess the entire site, as well as make use of any available literature, species distribution data and aerial photography. The EIA (spanning several years) and walkdown assessments were also conducted in peak rainfall/flowering seasons, so the results of this assessment are provided with a high level of confidence.

It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.



Figure 1: The proposed project layout used in the walk down assessment conducted in 2024, with the new internal roads and turbine positions in relation to the aquatic features delineated during the EIA phase of the project

2. RESULTS

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.

The features listed above, drain the study area in a north westerly region, forming part of a tributary of the Veldmans River (J21E) and Groot River (J23B) Quinary Catchment of the Great Karoo Ecoregion in the Breede-Gouritz Catchment Management Agency (George Regional Office). The Veldmans and Groot rivers in turn drain into the Gamka River.

No wetlands were found within the proposed development areas, only the riverine features such as alluvial floodplains and riparian thickets dominated by *Vachellia karroo, Searsia lancea, Euclea undulata, Gymonsporia buxifolia Ficinia nodusa, Carex spp, Centella asiatica, Erianthus capensis, Sporobolus fimbriatus, Cynodon incompletes, Prosopis spp (Exotic,) Eragrostis curvula, Erharta calcynia Merxmuellera disticha, and Cynodon dactylon* are found in close proximity to any of the proposed infrastructure.

Currently there are no formalised riverine or wetland buffer distances provided by the provincial authorities and as such the buffer model as described Macfarlane & Bredin (2017) for wetlands, rivers and estuaries was used. These buffer models are based on the condition of the waterbody, the state of the remainder of the site, coupled to the type of development, as wells as the proposed alteration of hydrological flows. Based then on the information known for the site the buffer model provided the following:

- Construction period: 10 m
- Operation period: 8 m
- Final: 10 m

Artificial dams were not buffered.

Therefore, the Table 1 below assesses the various watercourse units that may be affected by the new internal roads, hardstands, laydown areas, site camps.

All wind turbine towers, were confirmed to be outside of these areas.



Plate 1:



Plate 2:

Construction Features #	HGM Units	Description	Current state comment & potential impacts	Мар
1	Minor watercourse with no riparian vegetation and or aquatic vegetation	WTG K58	This small drainage feature (drainage line) will be avoided by the WTG, however the associated infrastructure spans this system. It is advised that the hardstand / blade laydown is rotated to avoid this area	
2	Minor watercourse with no riparian vegetation and or aquatic vegetation	WTG K05	These small drainage features (drainage line) will be avoided by the WTG, however the associated infrastructure spans this system. It is advised that the hardstand / blade laydown is rotated to avoid this area	

Table 1: Findings of the walkdown surveys for the structures shown in Figure 1 with specific reference to habitats observed within the development layout only

3	Minor watercourse with no riparian vegetation and or aquatic vegetation	WTG K01	The WTG and associated areas has avoided all aquatic features, but is located in and areas with past erosion, thus due care must be undertaken to improve drainage via appropriate stormwater management to prevent additional scour/erosion of the area. The remaining areas should then also be rehabilitated during the works period were located within the project footprint	
4	Minor watercourse with no riparian vegetation and or aquatic vegetation	WTG K016	These small drainage features (drainage line) will be avoided by the WTG, however the associated infrastructure spans this system. It is advised that the hardstand / blade laydown is rotated to avoid this area	

5	Minor watercourse with no riparian vegetation and or aquatic vegetation	WTG K17	These small drainage features (drainage line) will be avoided by the WTG, however the associated infrastructure spans this system. It is advised that the hardstand / blade laydown is rotated to avoid this area	
6	Minor watercourse with no riparian vegetation and or aquatic vegetation	WTG K22	These small drainage features (drainage line) will be avoided by the WTG, however the associated infrastructure spans this system. It is advised that the hardstand / blade laydown is rotated to avoid this area	

7	Minor watercourse with no riparian vegetation and or aquatic vegetation – found within lower valley areas – dominated by alluvial features	New internal roads for the development footprint	It is recommended that were a new road or existing road will be upgraded, that were several drainage features will be crossed, that low level causeways are used. This especially where no river banks or bank incision occurs, in the lower valley areas.	
---	---	---	--	--

3. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the walkdown, several sensitive areas are present within the region, but based on the field assessments, the final layouts and alignments were found to be located outside the majority of the high sensitive area identified during the EIA. All that remains are the recommendations made in Table 1, that will then see the avoidance of any additional impacts on the minor drainage lines shown.

The further the following recommendations are reiterated:

- Vegetation clearing should occur in a phased manner in accordance with the construction programme to minimise erosion and/or run-off.
- All construction materials including fuels and oil should be stored in demarcated areas that are
 contained within berms / bunds to avoid spread of any contamination. Washing and cleaning of
 equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive
 soil erosion. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent
 to any channel. It is therefore suggested that all construction camps, lay down areas, batching plants or
 areas and any stores should be outside of any demarcated water courses.
- All cleared areas must be re-vegetated after construction has been completed.
- All alien plant re-growth must be monitored, and should it occur, these plants should be eradicated. The scale of the operation does however not warrant the use of a Landscape Architect and / or Landscape Contractor.

4. APPENDIX 1 – SPECIALIST CV

CURRICULUM VITAE

• Dr Brian Michael Colloty

• 7212215031083

1 Rossini Rd

Pari Park

Port Elizabeth, 6070

brianc@envirosci.co.za

083 498 3299

Profession: Ecologist (Pr. Sci. Nat. 400268/07)

Member of the South African Wetland Society

Specialisation: Ecology and conservation importance rating of inland habitats, wetlands, rivers & estuaries

Years experience: 25 years

SKILLS BASE AND CORE COMPETENCIES

- 25 years experience in environmental sensitivity and conservation assessment of aquatic and terrestrial systems inclusive throughout Africa. Experience also includes biodiversity and ecological assessments with regard sensitive fauna and flora, within the marine, coastal and inland environments. Countries include Mozambique, Kenya, Namibia, Central African Republic, Zambia, Eritrea, Mauritius, Madagascar, Angola, Ghana, Guinea-Bissau and Sierra Leone. Current projects also span all nine provinces in South Africa.
- 15 years experience in the coordination and management of multi-disciplinary teams, such as specialist teams for small to large scale EIAs and environmental monitoring programmes, throughout Africa and inclusive of marine, coastal and inland systems. This includes project and budget management, specialist team management, client and stakeholder engagement and project reporting.
- GIS mapping and sensitivity analysis

TERTIARY EDUCATION

- 1994: B Sc Degree (Botany & Zoology) NMU
- 1995: B Sc Hon (Zoology) NMU
- 1996: M Sc (Botany Rivers) NMU
- 2000: Ph D (Botany Conservation Rating Systems (wetlands) NMU

EMPLOYMENT HISTORY

 1996 – 2000 Researcher at Nelson Mandela University – SAB institute for Coastal Research & Management. Funded by the WRC to develop estuarine importance rating methods for South African Estuaries

- 2001 January 2003 Training development officer AVK SA (reason for leaving sought work back in the environmental field rather than engineering sector)
- February 2003- June 2005 Project manager & Ecologist for Strategic Environmental Focus (Pretoria) (reason for leaving sought work related more to experience in the coastal environment)
- July 2005 June 2009 Principal Environmental Consultant Coastal & Environmental Services (reason for leaving company restructuring)
- June 2009 August 2018 Owner / Ecologist of Scherman Colloty & Associates cc
- August 2018 Owner / Ecologist EnviroSci (Pty) Ltd

SELECTED RELEVANT PROJECT EXPERIENCE

World Bank IFC Standards

- Botswana South Africa 400kv transmission line (400km) biodiversity assessment on behalf of Aurecon current
- Farim phosphate mine and port development, Guinea Bissau biodiversity and estuarine assessment on behalf of Knight Piesold Canada 2016.
- Tema LNG offshore pipeline EIA marine and estuarine assessment for Quantum Power (2015).
- Colluli Potash South Boulder, Eritrea, SEIA marine baseline and hydrodynamic surveys co-ordinator and coastal vegetation specialist (coastal lagoon and marine) (on-going).
- Wetland, estuarine and riverine assessment for Addax Biofeuls Sierra Leone, Makeni for Coastal & Environmental Services: 2009
- ESHIA Project manager and long-term marine monitoring phase coordinator with regards the dredge works required in Luanda bay, Angola. Monitoring included water quality and biological changes in the bay and at the offshore disposal outfall site, 2005-2011

South African

- Plant search and rescue, for NMBM (Driftsands sewer, Glen Hurd Drive), Department of Social Development (Military veterans housing, Despatch) and Nxuba Wind Farm, current
- Wetland specialist appointed to update the Eastern Cape Biodiversity Conservation Plan, for the Province on behalf of EOH CES appointment by SANBI current. This includes updating the National Wetland Inventory for the province, submitting the new data to CSIR/SANBI.
- CDC IDZ Alien eradication plans for three renewable projects Coega Wind Farm, Sonop Wind Farm and Coega PV, on behalf of JG Afrika (2016 2017).
- Nelson Mandela Bay Municipality Baakens River Integrated Wetland Assessment (Inclusive of Rehabilitation and Monitoring Plans) for CEN IEM Unit Current
- Rangers Biomass Gasification Project (Uitenhage), biodiversity and wetland assessment and wetland rehabilitation / monitoring plans for CEM IEM Unit current.
- Gibson Bay Wind Farm implementation of the wetland management plan during the construction and operation of the wind farm (includes surface / groundwater as well wetland rehabilitation & monitoring plan) on behalf of Enel Green Power current
- Gibson Bay Wind Farm 133kV Transmission Line wetland management plan during the construction of the transmission line (includes wetland rehabilitation & monitoring plan) on behalf of Eskom 2016.
- Tsitsikamma Community Wind Farm implementation of the wetland management plan during the construction of the wind farm (includes surface / biomonitoring, as well wetland rehabilitation & monitoring plan) on behalf of Cennergi completed May 2016.
- Alicedale bulk sewer pipeline for Cacadu District, wetland and water quality assessment, 2016
- Mogalakwena 33kv transmission line in the Limpopo Province, on behlaf of Aurecon, 2016
- Cape St Francis WWTW expansion wetland and passive treatment system for the Kouga Municipality, 2015
- Macindane bulk water and sewer pipelines wetland and wetland rehabilitation plan 2015

- Eskom Prieska to Copperton 132kV transmission line aquatic assessment, Northern Cape on behalf of Savannah Environmental 2015.
- Joe Slovo sewer pipeline upgrade wetland assessment for Nelson Mandela Bay Municipality 2014
- Cape Recife Waste Water Treatment Works expansion and pipeline aquatic assessment for Nelson Mandela Bay Municipality 2013
- Pola park bulk sewer line upgrade aquatic assessment for Nelson Mandela Bay Municipality 2013
- Transnet Freight Rail Swazi Rail Link (Current) wetland and ecological assessment on behalf of Aurecon for the proposed rail upgrade from Ermelo to Richards Bay
- Eskom Transmission wetland and ecological assessment for the proposed transmission line between Pietermaritzburg and Richards Bay on behalf of Aurecon (2012).
- Port Durnford Exarro Sands biodiversity assessment for the proposed mineral sands mine on behalf of Exxaro (2009)
- Fairbreeze Mine Exxaro (Mtunzini) wetland assessment on behalf of Strategic Environmental Services (2007).
- Wetland assessment for Richards Bay Minerals (2013) Zulti North haul road on behalf of RBM.
- Biodiversity and aquatic assessments for 125 renewable projects in the past 9 years in the Western, Eastern, Northern Cape, KwaZulu-Natal and Free State provinces. Clients included RES-SA, RedCap, ACED Renewables, Mainstream Renewable, GDF Suez, Globeleq, ENEL, Abengoa amongst others. Particular aquatic sensitivity assessment and Water Use License Applications on behalf of Mainstream Renewable Energy (8 wind farms and 3 PV facilities.), Cennergi / Exxaro (2 Wind farm), WKN Wind current (2 wind farms & 2 PV facilities), ACED (6 wind farms) and Windlab (3 Wind farms) were also conducted. Several of these projects also required the assessment of the proposed transmission lines and switching stations, which were conducted on behalf of Eskom.
- Vegetation assessments on the Great Brak rivers for Department of Water and Sanitation, 2006 and the Gouritz Water Management Area (2014)
- Proposed FibreCo fibre optic cable vegetation assessment along the PE to George, George to Graaf Reinet, PE to Colesburg, and East London to Bloemfontein on behalf of SRK (2013-2015).