MAINSTREAM RENEWABLE POWER

Proposed Construction of a Wind Farm in Loeriesfontein, Northern Cape Province of South Africa

Scoping Biodiversity Assessment

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For:	SiVEST Environmental Division

Declaration

I, Liesl Koch, declare that I –

- act as an independent specialist consultant in the fields of Biodiversity (Fauna and Flora) for the **Biodiversity Scoping Report for the proposed wind farm, Loeriesfontein**;
- 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 Environmental Impact Assessment Regulations, 2010;
- have and will not have any vested interest in the proposed activity proceeding;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake to disclose, to the 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 Environmental Impact Assessment Regulations, 2010; and
- will provide the competent authority with access to all information at our disposal regarding the application, whether such information is favourable to the applicant or not.

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Senior Environmental Scientist
SiVEST Environmental Division

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1 INTRODUCTION

SiVEST have been appointed by South Africa Mainstream Renewable Power South Africa to undertake a specialist biodiversity assessment for the proposed wind farm in Loeriesfontein in the Northern Cape.

These studies form part of a wider Environmental Impact Assessment (Scoping and Environmental Impact Assessment) that needs to be undertaken by the project proponent to identify and assess all the potential environmental impacts associated with the proposed project.

This scoping study aims to identify possible Biodiversity (Floral, faunal and Avifaunal) issues that would need to be addressed in the Biodiversity Assessment, as well as inform preferred sites for the proposed infrastructure. The study will also aim to identify sensitive areas from a biodiversity perspective and identify the potential presence of Red Data species. The study area falls within the Nama Karoo Biome. The vegetation unit is described below.

2 POLICY AND LEGISLATION

2.1 National Environmental Management Act: Biodiversity Act

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) operates in conjunction with the National Environmental Management: Protected Areas Act No. 57 of 2003. Both Acts emerge from the recommendations of the White Paper on the Conservation and Sustainable Use of South Africa's Biodiversity (1998) and were originally conceived of as one Act.

The objectives of the Act are:

- within the framework of the National Environmental Management Act, to provide for:

- the management and conservation of biological diversity within the Republic and of the components of such biological diversity;
- the use of indigenous biological resources in a sustainable manner; and
- the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;
- to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;
- to provide for co-operative governance in biodiversity management and conservation; and to provide for a South African National Biodiversity Institute (SANBI) to assist in achieving the objectives of the Act.

The Act provides specifically for the issuing of permits. Before issuing a permit, the issuing authority may in writing require the applicant to furnish it, at the applicant's expense, with such independent risk assessment or expert evidence as the issuing authority may determine. Regulations may be made pertaining to various matters regulated by the Act, offences and penalties are provided for, and consultation processes are prescribed. Should Red Data species be directly affected by the proposed lines or substation site, then the necessary permits will be required to be applied for.

2.2 Nature Conservation Ordinance

These are developed to protect both animal and plant species within the various provinces of the country which warrant protection. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation. The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) and the Nature and Environmental Conservation Ordinance 19 of 1974 are of relevance to the Northern Cape Province.

A floral biodiversity assessment has been conducted to explore how the proposed development may impact on flora as protected by the Act.

2.3 Site Locality

Loeriesfontein is a small town in the Northern Cape of South Africa. It falls within the Hantam region. The town of Loeriesfontein is within a basin surrounded by mountains, and it is accessed from the N7 highway (north out of Cape Town), turning off on the R27 at Van Rhynsdorp to Nieuwoudtville, then following the R357 to Loeriesfontein (a further 65km north).

The proposed site is located on the farms Sous and Aan De Karree Doorn Pan approximately 60km north of Loeriesfontein. The site falls within the boundaries of the Hantam Local Municipality and in the greater Namakwa District Municipality. The site is approximately 10 400ha in size of which a smaller area will be required for the establishment of the proposed wind farm.

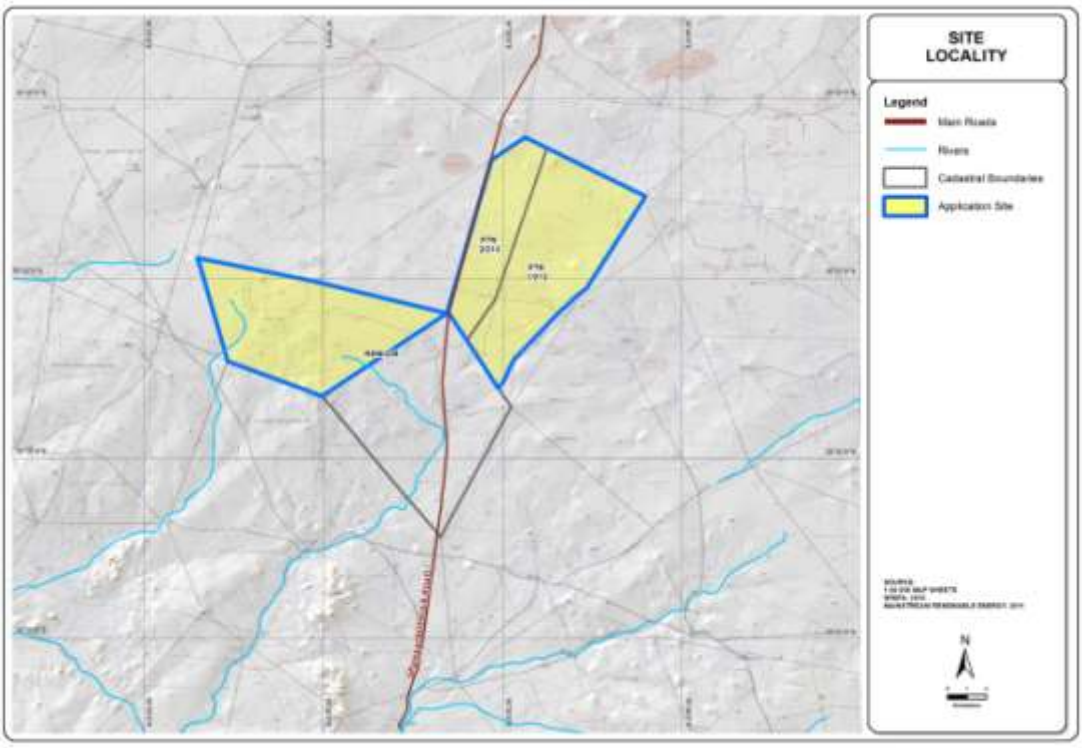

Figure 1: Site Locality

3 METHODOLOGY

The aim of the study was to determine potential issues associated with the proposed project on fauna and flora, with special attention given to Red Data species.

Findings of this report are based on desk top assessments rather than field verification. This will be conducted during the next phase of assessment. It must be remembered that the scoping phase of a project is utilised to identify issues and potential impacts which require further assessment in the impact phase of a study.

3.1 Flora

Searches were undertaken specifically for Red List plant species (according to SANBI 2006) and any other species with potential conservation value within the study area. Furthermore Vegetation types and flora therein were identified through SANBI as well as Mucina and Rutherford 2006. Mucina and Rutherford (2006) was also used to describe the various vegetation units.

3.2 Fauna

The following faunal groupings were investigated:

- Mammals
- Amphibians
- Reptiles
- Avifauna

Potential species lists have been compiled with attention given to protected and endangered species in terms of the IUCN Red Data List.

3.3 Assumptions and limitation

Because faunal populations are dependent on the flora that supports them, assumptions regarding the presence of fauna can be made based on the flora present. However, as this is a desk top study, the presence of fauna detailed below cannot be confirmed as field verification has not, at this point, been undertaken.

Every attempt has been made to use the latest information for each faunal grouping however some groupings only have data which are out of date and therefore not as reliable.

4 DESCRIPTION OF THE ENVIRONMENT

4.1 Climate

The study area has an arid Mediterranean type climate with winter rainfall regime i.e. most of the rainfall is confined to early autumn and winter. Mean Annual Precipitation (MAP) is approximately 179 mm per year and without some form of supplementary irrigation natural rainfall is insufficient to produce sustainable harvests (Table 1 and Figure 2). This is reflected in the lack of dry land crop production within the study area. Average daily temperatures range from 30°C in summer to 17°C in winter. Average night time temperatures drop to around 2.4°C during winter (Table 2).

Table 1: Mean monthly rainfall for Loeriesfontein (Source: South Africa's Rain Atlas)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Rainfall (mm)	8.7	11.3	17	20.8	23.3	21.1	18.3	14.3	11.1	9	7	7	14.1

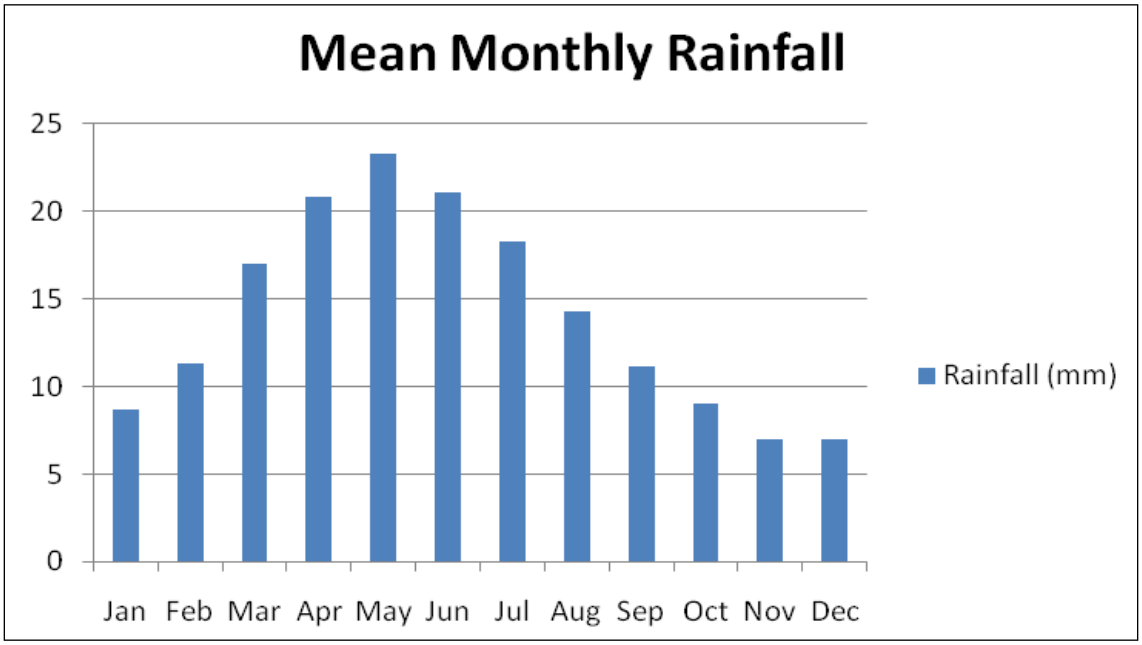

Figure 2: Mean Monthly Rainfall Graph for Loeriesfontein

Table 2: Mean monthly and annual temperature for Loeriesfontein (Source: http://www.saexplorer.co.za)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Avg
Midday Temp (°C)	21	32	29	25	21	17	17	19	22	25	28	30	24
Night Temp (°C)	31	14	13	9	6	4	2	3	5	8	10	12	8

4.2 Topography

The study area is characterised by flat and gently sloping topography with an average gradient of less than 10%. The area is flat and thus the topography is not a limiting factor for either agricultural or the proposed development

4.3 Land use

The study area is classified as natural / vacant and is used as general grazing land for sheep and wildlife. Vast grazing land is interspersed with seasonal pans and non-perennial streams.

4.4 Vegetation

According to Mucina, *et al,* (2006), the proposed wind farm site in Loeriesfontein falls within the Bushmanland Basin Shrubland vegetation type which is classified under the Bushmanland and West Griqualand bioregion of the Nama Karoo Biome (Mucina, *et al.,* 2006). In terms of the conservation status, the Bushmanland Basin Shrubland vegetation type is considered Least Threatened (Mucina, *et al,* (2006). No other vegetation types are present on the site hence the absence of a vegetation map.

According to Esler, *et al.,* (2006), vegetation cover in the study area ranges from 15% to 20% which is the lowest compared to other parts of the country i.e. the central and eastern parts. Vegetation cover refers to the percentage of soil overshadowed by plants (Esler, *et al.,* 2006).

4.5 Habitats

Faunal populations are dependent on the flora that supports them therefore assumptions regarding the presence of fauna can be made based on the flora present. The study area is very uniform in nature with characteristic Nama Karoo shrubland. No larger trees are present on the site.

4.6 Transformation

The study area currently operates as a functioning sheep farm and is not likely to be pristine in nature. However the transformation rate of this vegetation type is low with hardy species present. The site can thus be considered to be in a fairly natural state.

4.7 Flora in the study area

A list of plant species including Red Data species are presented in Appendix 1.

According to the Namakwa Bioregional Plan, the Hantam Local Municipality has 59 threatened, 9 near threatened and 25 data deficient plant species. The majority of the Municipality is not conserved in any way, including the study area in question. The vegetation type in question has more than 10 endemic species.

The vegetation type on the site is described as Bushmanland Basin Shrubland (Figure 3).

This vegetation type is characterised by low shrubs species which include: *Aptosimum spinescens*, *Hermannia spinosa*, *Pentzia spinescens, Zygophyllum microphyllum* and *Aptosimum elongatum*.

The vegetation type is considered to be Least Threatened and none of it is conserved in statutory conservation areas (Mucina, *et al,* (2006).

The study area is transformed after good winter rains into a large expanse of wild flowers however not as spectacularly as areas further south. This is however heavily dependent on the amount of rainfall.

The study area does not fall into a Critical Biodiversity Area as defined by the Namakwa Bioregional Plan.

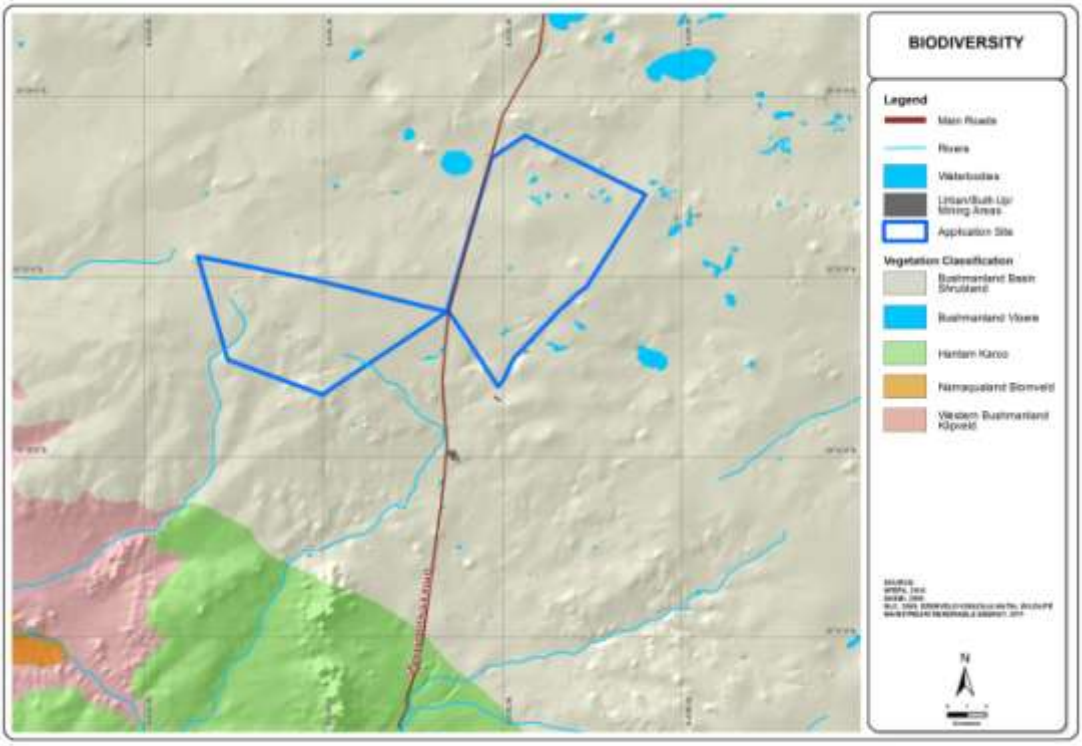

Figure 3: Vegetation of the study area

4.7.1 Potential impacts

A number of potential impacts could be associated with the proposed wind farm. The clearing for the wind farm and associated infrastructure is likely to result in loss of vegetation and more importantly natural vegetation. This can also result in habitat fragmentation due to loss of ecological linkages which may be present across the site. The clearing of vegetation could also result in the introduction of exotic species into the study area.

4.8 Fauna in the study area

Friedman and Daly, (2004) list several red data mammal species that could potentially occur in the study area. The Honey Badger (*Mellivora capensis*) and the Littledale's Whistling Rat (*Parotomys littledalei*) both listed as Near Threatened are likely to occur in the study area. On the other hand, the Black Rhinoceros (*Diceros bicornis bicornis*) which is listed as Critically

Endangered along with several other recorded mammal species are not likely to occur in the study area due to the anthropogenic activities such as fencing etc that have taken place.

No Important Bird Areas are on or near the site in question and very little bird data is available for the area.

Amphibians have been recorded for the study area however these are likely to be present near water courses. The study area is extremely dry and the presence of amphibians is unlikely.

Several reptile species are likely to be present and these are listed below.

Invertebrate information for the study area is limited although several species are anticipated to be present. The Namakwa Bioregional Plan indicates a high diversity of invertebrate species associated with the pollination systems associated with all the flowers.

5 FAUNAL ASSEMBLAGES

5.1 Mammals

Various mammal species are likely to occur within the study area. Appendix 2 comprises a list of mammals that are likely to occur in study area with the assigned level of threat facing each particular species. A map was used to correlate the occurrence of the Red Data species with their approximate occurrence within the study area. According to Friedman & Daly, (2004), the majority of species within the study area are listed as species of least concern. As mentioned above, the Honey Badger (*Mellivora capensis*) and the Littledale's Whistling Rat (*Parotomys littledalei*) which are both listed as Near Threatened are likely to occur in the study area. On the other hand, the Black Rhinoceros (*Diceros bicornis bicornis*) which is listed as Critically Endangered along with several other recorded mammal species are not likely to occur in the study area due to the anthropogenic activities such as fencing etc that have taken place.

5.1.1 Potential impacts

The proposed wind farm could potentially result in the destruction of the habitat available for these species.

5.2 Amphibians

All amphibian species previously recorded in the study area are Not Threatened (Du Preez and Carruthers, 2009). The study area is extremely dry with very little rainfall and amphibian numbers are expected to be very low. The table below indicates the species that have been previously recorded.

Table 3: Amphibian species in the study area

Scientific	Common	Category
Vandijkophrynus gariepensis	Karoo Toad	Not threatened
Vandijkophrynus robinsoni	Paradise Toad	Not threatened
Cacosternum boettgeri	Boettger's Caco	Not threatened
Amietia fuscigula	Cape River Frog	Not threatened
Xenopus laevis	Common Platanna	Not threatened

5.2.1 Potential impacts

The construction of the proposed wind farm could result in habitat destruction for amphibian species.

5.3 Reptiles

Several reptile species are present in the study area. Table 4 highlights these species (Branch 1998). According to the current Red Data information, none of these species are currently Red Listed (McLachlan, 1978). The Red Data book is currently being updated.

Habitat for these species is currently available.

Table 4: Reptiles in the study area

Common name	Scientific name
Tent tortoise	*Psammobates tentorius*
Delalande's Beaked Blind Snake	*Rhinotyphlops lalandei*
Schinz's Beaked Blind Snake	*Rhinotyphlops schinzi*
Brown House Snake	*Lamprophis fuliginosis*
Mole snake	*Pseudoaspis cana*
Sundevall's shovel -snout	*Prosymna sundevallii*

Common name	Scientific name
Dwarf Beaked Snake	*Dipsina multimaculata*
Karoo Sand Snake or Whip Snake	*Psammophis notostictus*
Namib Sand Snake	*Psammophis leightoni*
Common or Rhombic Egg Eater	*Dasypeltis scabra*
Beetz's Tiger Snake	*Telescopus beetzii*
Coral Snake	*Aspidelaps lubricus*
Cape Cobra	*Naja nivea*
Black-necked Spitting Cobra	*Naga nigricollis*
Puff adder	*Bitisarietansarietans*
Horned adder	*Bitis caudalis*
Striped legless skink	*Acontiasl ineatus*
Cape skink	*Mabuya capensis*
Western Three-stripped Skink	*Mabuya occidentalis*
Western Rock Skink	*Mabuya sulcata*
Variegated skink	*Mabuya variegata*
Spotted Desert Lizard	*Meroles suborbitalis*
Western Sandveld Lizard	*Nucras tessellata*
Cape Sand Lizard	*Pedioplanis laticeps*
Spotted sand lizard	*Pedioplanis lineoocellata pulchella*
Namaqua Sand Lizard	*Pedioplanis namaquensis*
Armadillo Girdled Lizard	*Cordyluscataphractus*
Karoo girdled lizard	*Cordylus polyzonus*
Southern Rock Agama	*Agama atra*
Southern Spiny Agama	*Agama hispida*
Namaqua Chameleon	*Chamaeleo namaquensis*
Giant Ground Gecko	*Chondrodactylus angulifer*
Striped Dwarf Leaf-toed Gecko	*Goggia lineata*
Bibron's Thick-toed Gecko	*Pachydactylus bibronii*
Marico Thick-toed Gecko	*Pachydactylus mariquensis mariquensis*
Rough Thick-toed Gecko	*Pachydactylus rugosus formosus*
Common Barking Gecko	*Ptenopus garrulus*
Weber's Thick-toed Gecko	*Pachydactylus weberi*

5.3.1 Potential impacts

The proposed wind farm could potentially result in habitat destruction for these reptile species.

5.4 Invertebrates

No detailed assessment of invertebrates species has been undertaken. These species are mobile in nature and are not likely to be affected by the construction of the wind farm. No unique larval habitat is present on the site which could impact on invertebrate species. Mitigation measures to reduce habitat destruction will aid in the preservation of habitat for invertebrate species.

5.5 Avifauna

The Avifauna assessment complies with the guidelines for avian monitoring at wind energy developments produced by the Wildlife and Energy Programme of the Endangered Wildlife Trust and BirdLife South Africa.

The study area is characterised by a wide range of bird species which could potentially be affected by the proposed wind farm. The impacts of wind farms on birds are well known and well documented. These relate to collision, displacement due to disturbance, barrier effects as well as habitat loss. These impacts will be addressed in more detail during the EIA phase of this study. A list of some bird species that occur in the study area is presented in Table 5 below. Further lists will be obtained from the Southern African Bird Atlas Project 2 (SABAP 2) website and through field surveys during the EIA phase. Bird monitoring is currently underway on the site to identify species diversity and habits. This will take place over a 12 month period.

Table 5: Bird Species in the study area

Roberts Bird Number	Common Name	Scientific name
866	Yellow Canary	*Crithagra flaviventris*
865	White-throated Canary	*Crithagra albogularis*
474	Spike-heeled Lark	*Chersomanes albofasciata*
311	Speckled Pigeon	*Columba guinea*
572	Sickle-winged Chat	*Cercomela sinuata*
619	Rufous-eared Warbler	*Malcorus pectoralis*
488	Red-capped Lark	*Calandrella cinerea*
479	Red Lark	*Calendulauda burra*
522	Pied Crow	*Corvus albus*
871	Lark-like Bunting	*Emberiza impetuani*
218	Ludwig's Bustard	*Neotis ludwigii*
583	Karoo Scrub-Robin	*Cercotrichas coryphoeus*
220	Karoo Korhaan	*Eupodotis vigorsii*
566	Karoo Chat	*Cercomela schlegelii*
122	Greater Kestrel	*Falco rupicoloides*

Roberts Bird Number	Common Name	Scientific name
570	Familiar Chat	*Cercomela familiaris*
786	Cape Sparrow	*Passer melanurus*
523	Cape Crow	*Corvus capensis*
861	Black-headed Canary	*Serinus alario*
575	Ant-eating Chat	*Myrmecocichla formicivora*

According to Barnes 1998, the following Red Data bird species occur within the study area.

Table 6: Red Data Bird Species (Barnes 1998)

Common name	Scientific name	Status
Martial Eagle	*Polemaetua bellicosus*	Vulnerable
Kori Bustard	*Ardeotis kori*	Vulnerable
Ludwig's Bustard	*Neotis Ludwiggi*	Vulnerable
Red Lark	*Certhilauda burra*	Vulnerable
Lesser Kestrel	*Falco naumanni*	Vulnerable
Blue Crane	*Anthropoides paradiseus*	Vulnerable

5.5.1 Potential impacts

Impacts of any given wind farm on bird species vary tremendously and depending on a number of factors such as the development specification, nearby topography, affected habitats as well as the number and type of bird species that occur in a study area. Although, Red Data species are a major concern, the impact on the more common species must not be overlooked. Various impacts are possible with regards to the proposed infrastructure and these are listed below.

The proposed wind farm could potentially result in impacts such as collision, displacement due to disturbance, barrier effects and habitat loss for bird species. These are elaborated below:

- Collisions

A number of factors namely bird species, numbers and behavior; weather conditions and topography as well as the nature of the wind farm and the use of lighting, determine collision risk pertaining to wind turbines (Drewitt and Langston 2006). This risk is perhaps greater in areas which are frequently utilized by large numbers of feeding or roosting birds, or on migratory flyways or local flight paths. In terms of weather conditions, various studies (e.g. Karlsson (1983), Erickson *et al.* (2001)) have indicated that due to poor visibility as a result of fog or rain majority of birds collide with structures. Moreover most birds fly at low levels during such weather conditions (Drewitt and Langston 2006). Furthermore, strong headwinds increase collision risks yet

migrating birds have a tendency of flying at low levels when flying into the wind (Drewitt and Langston 2006).

Large birds such as cranes and bustards maneuver poorly. Therefore the risk of collision of these large birds with structures is great. In addition, species such as cranes arriving at a roost site after sunset are not likely to detect and avoid wind turbines (Drewitt and Langston 2006).

- Displacement due to disturbance

The presence of the turbines through visual, noise and vibration impacts as well as vehicle and personnel movements related to site maintenance may cause displacement. The level of disturbance resulting from introduction of wind farms in an area varies depending on a variety of factors such as seasonal and diurnal patterns of use by bird species, proximity to important habitats, alternative habitats availability as well as possibly turbine and wind farm specifications (Drewitt and Langston 2006).

Displacement also occurs when birds alter their migration flyways or local flight paths in order to avoid a wind farm. Alteration of migration flyways or local flight paths leads to increased energy expenditure as birds normally fly further as well as disruption of linkages between distant feeding, roosting, moulting and breeding areas (Drewitt and Langston 2006).

- Habitat loss

According to Fox *et al.* 2006, actual habitat loss typically amounts 2-5% of the total development area. Although, the scale of direct loss of habitat due to construction of a wind farm depends on the size of the project, it is likely to be small per turbine base (Fox *et al.* 2006).

The significance of the above potential impacts will be discussed in more details during the EIA phase

6 SENSITIVE AREAS

It is always a recommendation that new infrastructure, where possible, follows existing infrastructure such as roads and existing electrical servitudes in order to consolidate impacts. Technically this is not always possible but it is the best option from a biodiversity perspective.

Detailed site layout information is not available at this stage but will be available during the EIA phase. However it is possible to identify areas within the study area which are not preferable for development. These areas will form the focus of the EIA studies.

The site in question is extremely uniform in nature and no specific sensitive areas could be identified at this stage. The entire study area will be investigated in more detail in the EIA phase to determine if there are areas which are more sensitive than others.

There are small drainage lines is in the south western portion of the site and these will potentially be considered no go zones from a biodiversity perspective.

7 POTENTIAL IMPACTS

7.1 Floral impacts

Table 7: Impact of the Loss of Natural Vegetation

ISSUE	Impact: loss of natural vegetation
DISCUSSION	Losses would be suffered where areas need to be cleared of natural vegetation.
EXISTING IMPACT	The existing impact is very low as the majority of vegetation is mostly intact.
PREDICTED IMPACT	Moderate as natural vegetation will be lost.
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Predicted to be low due to the majority of the site being able to be retained once the infrastructure is in place.

Table 8: Fragmentation in Natural Systems

ISSUE	Impact: fragmentation in natural systems
DISCUSSION	Fragmentation could occur if the proposed infrastructure isolates habitats.
EXISTING IMPACT	Fragmentation is fairly low on the site at present however barriers such as existing roads and railway lines are already present.
PREDICTED IMPACT	Moderate as siting of infrastructure will ensure that ecological linkage is retained.
EIA INVESTIGATION REQUIRED	Yes in order to retain ecological linkage.
CUMULATIVE EFFECT	Moderate due to existing level of impact.

Table 9: Impact on Sensitive Vegetation

ISSUE	Impact: sensitive vegetation
DISCUSSION	A number of endemic species are present in this vegetation type and these species are likely to be affected by the proposed development
EXISTING IMPACT	Low given the level of grazing activities (mostly sheep) which are present
PREDICTED IMPACT	The impact is predicted to be low as the more suitable areas away from

ISSUE	Impact: sensitive vegetation
	these sensitive features will be utilised. Not all vegetation will be required to be cleared.
EIA INVESTIGATION REQUIRED	Yes to ensure the infrastructure is located away from these sensitive features.
CUMULATIVE EFFECT	Moderate due to the level of existing impact.

7.2 Faunal impacts

Table 10: Impact on the loss of habitat

ISSUE	Impact: Loss of habitat for faunal species
DISCUSSION	The proposed development could result in a loss of habitat for several faunal species, particularly in the areas identified as sensitive.
EXISTING IMPACT	Intensive grazing is taking place in parts of the study area and large parts have been transformed.
PREDICTED IMPACT	The clearing of a site for the proposed wind farm is likely to result in loss of habitat however placement will be critical to determine the level of this impact.
EIA INVESTIGATION REQUIRED	Yes to determine the site with the least habitat loss for faunal species.
CUMULATIVE EFFECT	Cumulative impacts could relate to the edge effect and potential long term habitat loss as a result although very little natural vegetation is present.

Table 11: Impact of bird collisions with wind turbines

ISSUE	Impact : Bird collisions with wind turbines
DISCUSSION	Proposed infrastructure could result in bird collisions with wind turbines.
EXISTING IMPACT	No existing impacts exist.
PREDICTED IMPACT	The proposed project could result in bird mortalities which are currently not being experienced in an area with rich bird life.
EIA INVESTIGATION REQUIRED	Yes to investigate this impact further and investigate mitigation measures.
CUMULATIVE EFFECT	Cumulative impacts are anticipated to be low at this stage as no other similar infrastructure is present.

8 METHODOLOGY FOR IMPACT ASSESSMENT

8.1 Determination of Significance of Impacts

Significance isdetermined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 13.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

8.2 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should bedetailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

8.2.1 Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 12: Description of terms

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	International and National	Will affect the entire country
2	Province/region	Will affect the entire province or region
3	Local/district	Will affect the local area or district
4	Site	The impact will only affect the site
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Irreversible	The impact is irreversible and no mitigation measures exist.
2	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
3	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.

4	Completely reversible	The impact is reversible with implementation of minor mitigation measures
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative

		effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
Significance		
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.** The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which		

can be measured and assigned a significance rating.		
Points	**Impact Significance Rating**	**Description**
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

The table below is to be represented in the Impact Assessment section of the report.

Table 13: Rating of impacts

IMPACT TABLE FORMAT	
Environmental Parameter	*A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water*
Issue/Impact/Environmental Effect/Nature	*A brief description of the nature of the impact that is likely to affect the environmental aspect as a result of the proposed activity e.g. alteration of aquatic biota The environmental impact that is likely to positively or*

IMPACT TABLE FORMAT		
	negatively affect the environment as a result of the proposed activity e.g. oil spill in surface water	
Extent	*A brief description indicating the chances of the impact occurring*	
Probability	*A brief description of theability of the environmental components recovery after a disturbance as a result of the proposed activity*	
Reversibility	*A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water*	
Irreplaceable loss of resources	*A brief description of the degree in which irreplaceable resources are likely to be lost*	
Duration	*A brief description of the amount of time the proposed activity is likely to take to its completion*	
Cumulative effect	*A brief description of whether the impact will be exacerbated as a result of the proposed activity*	
Intensity/magnitude	*A brief description of whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily*	
Significance Rating	*A brief description of the importance of an impact which in turn dictates the level of mitigation required*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	1
Probability	4	1
Reversibility	4	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	4	1
Intensity/magnitude	4	1
Significance rating	-96 (high negative)	-6 (low negative)
Mitigation measures	*Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. Describe how the mitigation measures have reduced/enhanced the impact with relevance to the impact criteria used in analyzing the significance. These measures will be detailed in the EMPR.*	

9 IMPLICATIONS FOR DEVELOPMENT

The proposed study area is extremely large with various sites available for the proposed development. Detailed investigations are required to identify a suitable site given the uniform nature of the study area.

The layout plans which will be available during the EIA phase will provide alternatives for assessment and this will guide the impact assessment.

Large expanses of vegetation will remain after construction and habitat will thus remain available for smaller faunal species and allow for the free movement of these species. Due to construction and the associated clearing of vegetation, it is expected that some habitat destruction will take place and the likelihood of edge effects (effect of the removal of natural vegetation resulting in ecological changes such as alien infestation) occurring is fairly high. However, various mitigation measures can be put in place to minimise the impact of construction on biodiversity in order to limit habitat destruction and alien infestation.

Detailed investigations of avifaunal impacts will be the focus of the EIA studies as this faunal grouping is sensitive to developments such as this.

Note that while there are various Red Data species that are likely to occur, the specific mention of Red Data species does not remove any importance from the common faunal and floral species which are likely to occur in the study area. Red Data species receive a higher priority due to their declining populations and thus require higher conservation awareness.

Together with the conspicuous mammal species, several invertebrate species are very likely to be present. It will be difficult to monitor whether these species are present due to their small size but an awareness of their presence is important.

It is important that sensitive faunal and floral species are identified through this process and protected accordingly during the construction phase should they be present. Some negative environmental impacts on biodiversity are unavoidable although they can be minimised with the use of strict mitigation measures. As reflected for other aspects of biodiversity, the preferred site should be placed in areas that have already been impacted, rather than in areas where little to no impact has occurred.

10 MITIGATION MEASURES

Detailed mitigation measures with regards to biodiversity will be identified during the EIA phase of the project when detailed assessments have been conducted. As a principle, mitigation measures will be strict for sensitive areas. Ideally it is preferable to place the infrastructure away from the sensitive areas identified and away from habitat that may house Red Data species. The detailed mitigation measures will be included in the EMPr.

11 CONCLUSION AND WAY FORWARD

The uniform nature of the site has made it difficult to identify distinct sensitive areas. At this stage the entire site will be investigated during the EIA phase to identify a suitable site for the proposed development.

Detailed recommendations on site selection will be undertaken during the EIA phase when layouts and alternatives are made available.

Detailed assessments will take place during the EIA phase and this will involve more detailed species identification and investigation of impacts.

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Appendix 1

Floral species in the study area

Family	Species	Threat status	SA Endemic
AIZOACEAE	*Galenia squamulosa (Eckl. & Zeyh.) Fenzl*	LC	No
ASPARAGACEAE	*Asparagus capensis L. var. capensis*	LC	No
ASTERACEAE	*Pteronia mucronata DC.*	LC	No
ASTERACEAE	*Amellus microglossus DC.*	LC	Yes
ASTERACEAE	*Arctotis fastuosa Jacq.*	LC	No
ASTERACEAE	*Eriocephalus spinescens Burch.*	LC	Yes
ASTERACEAE	*Foveolina dichotoma (DC.) Källersjö*	LC	No
ASTERACEAE	*Helichrysum herniarioides DC.*	LC	No
ASTERACEAE	*Lasiopogon glomerulatus (Harv.) Hilliard*	LC	No
ASTERACEAE	*Osteospermum spinescens Thunb.*	LC	No
ASTERACEAE	*Pteronia leucoclada Turcz.*	LC	No
ASTERACEAE	*Sonchus oleraceus L.*	NE	No
BRASSICACEAE	*Heliophila arenosa Schltr.*	LC	Yes
CHENOPODIACEAE	*Atriplex eardleyae Aellen*	NE	No
CHENOPODIACEAE	*Bassia salsoloides (Fenzl) A.J.Scott*	LC	No
CHENOPODIACEAE	*Atriplex lindleyi Moq. subsp. inflata (F.Muell.) Paul G.Wilson*	NE	No
CHENOPODIACEAE	*Atriplex nummularia Lindl. subsp. nummularia*	NE	No
CHENOPODIACEAE	*Salsola aphylla L.f.*	LC	No
CHENOPODIACEAE	*Salsola henriciae I.Verd.*	LC	Yes
FABACEAE	*Lotononis leptoloba Bolus*	LC	Yes
FABACEAE	*Sutherlandia frutescens (L.) R.Br.*	LC	No
FRANKENIACEAE	*Frankenia pulverulenta L.*	LC	No
IRIDACEAE	*Tritonia karooica M.P.de Vos*	LC	Yes
LAMIACEAE	*Salvia disermas L.*	LC	No
MELIANTHACEAE	*Melianthus comosus Vahl*	LC	No
MESEMBRYANTHEMACEAE	*Psilocaulon junceum (Haw.) Schwantes*	LC	Yes
MESEMBRYANTHEMACEAE	*Aloinopsis luckhoffii (L.Bolus) L.Bolus*	DDT	Yes
MOLLUGINACEAE	*Hypertelis salsoloides (Burch.) Adamson var. salsoloides*	LC	No
PLUMBAGINACEAE	*Dyerophytum africanum (Lam.) Kuntze*	LC	No
POACEAE	*Schismus barbatus (Loefl. ex L.) Thell.*	LC	No
POACEAE	*Enneapogon scaber Lehm.*	LC	No
SCROPHULARIACEAE	*Aptosimum indivisum Burch. ex Benth.*	LC	Yes
SCROPHULARIACEAE	*Aptosimum procumbens (Lehm.) Steud.*	LC	No
SCROPHULARIACEAE	*Nemesia calcarata E.Mey. ex Benth.*	LC	Yes
SOLANACEAE	*Lycium cinereum Thunb.*	LC	No
ZYGOPHYLLACEAE	*Zygophyllum simplex L.*	LC	No

Appendix 2

Red data faunal species potentially occurring in the Study area

Mammals

Scientific	Common	Category
Antidorcas marsupialis	Springbok	Least Concern
Diceros bicornis bicornis	Black Rhinoceros	Critically Endangered
Oreotragus oreotragus	klipspringer	Least Concern
Oryx gazella	Gemsbok	Least Concern
Raphicerus campestris	Steenbok	Least Concern
Sylvicapra grimmia	Common Duiker	Least Concern
Procavia capensis	Rock Hyrax	Least Concern
Canis mesomelas	*Black-Backed Jackal*	Least Concern
Caracal caracal	Caracal	Least Concern
Cynictis penicillata	Yellow Mongoose	Least Concern
Felis nigripes	Black-footed Cat	Least Concern
Felis Silverstris	African Wild Cat	Least Concern
Galerella pulverulenta	Small Grey mongoose	Least Concern
Genetta genetta	Small-spotted Genet	Least Concern
Ictonyx striatus	Striped Polecat	Least Concern
Mellivora capensis	Honey Badger	Near Threatened
Otocyon megalotis	Bat-eared Fox	Least Concern
Panthera pardus	Leopard	Least Concern
Proteles critatus	Aardwolf	Least Concern
Suricata suricatta	Suricate	Least Concern
Vulpes Chama	Cape Fox	Least Concern
Neoromicia capensis	Cape Serotine Bat	Least Concern
Nycteris thebiaca	Egyptian Slit-faced Bat	Least Concern
Tadarida aegyptiaca	Egyptian Free-tailed Bat	Least Concern
Chrysochloris asiatica	Cape Golden Mole	data deficient
Crocidura cyanea	Reddish-grey Musk Shrew	data deficient
Lepus capensis	Cape Hare/Desert Hare	Least Concern
Lepus saxatilis	Scrub Hara	Least Concern
Aethomys namaquensis	Namaqua Rock Mouse	Least Concern
Cryptomys hottentotus	Common Mole-rat	Least Concern
Desmodillus auricularis	Short-tailed Gerbil	Least Concern
Gerbillurus paeba	Hairy-footed Gerbil	Least Concern
Graphiurus ocularis	Spectacled Dormouse	Least Concern
Hysterix africaeaustralis	Porcupine	Least Concern
Malacothrix typica	Large-eared Mouse	Least Concern
Otomys unisulcatus	Karoo Bush Rat	Least Concern
Parotys bransil	Brant's Whistling Rat	Least Concern
Parotomys littledalei	Littledale's Whistling Rat	Near Threatened
Pedetes capensis	Springhare	Least Concern
Pteromyscus collinus	Pygmy Rock Mouse	Least Concern

Scientific	Common	Category
Rhabdomys pumillio	Striped Mouse	Least Concern
Marcoscelides proboscideus	Round-eared Elephant-Shrew	Least Concern
Orycteropus afer	Aardvark	Least Concern

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