Proposed Wind Energy Facility and Associated Infrastructure:
Terrestrial Fauna Scoping Report

Prepared by

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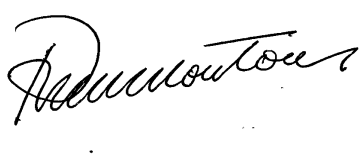

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EXECUTIVE SUMMARY

Eskom identified a potential site on the Cape West Coast for the establishment of a wind energy facility. The aim of this report is to describe the receiving environment in terms of its habitat and associated fauna, and to identify and describe potential impacts that the wind energy plant and associated access road and powerline could have on terrestrial fauna (excluding birds).

From a literature survey and previous studies in the area it is clear that, as far as terrestrial fauna is concerned, there are no major issues that may influence the siting of turbines at the proposed site. A wide range of vertebrate species, including threatened lizard and mammal species, are expected to occur in the general area where development will take place. Of the four faunal habitats identified in the immediate area (coastal strip, coastal dunes, rock and inland Succulent Karoo vegetation), the wind energy facility will only impact on the inland Succulent Karoo habitat (Namaqualand Strandveld and Namaqualand Sand Fynbos). Because of its extent and homogenous nature, this habitat should be the least sensitive of the four habitats, although at least two Red Data reptile and one Red Data mammal species may be associated with it. Five risk sources may be associated with establishing a wind energy and associated infrastructure in the proposed area, namely direct mortality of species of conservation concern, habitat destruction, increased road kills, the barrier effect of roads and fences, and bat collision fatality. Possible negative impacts associated with these risk sources will in all cases probably be of low to very low significance, but final conclusions can only be reached once the presence/absence of Red Data species on the proposed site has been confirmed.

During the EIA phase of the project, a comprehensive faunal survey of the site will be undertaken, particularly focussing on establishing the presence of Red Data species.

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1. INTRODUCTION

1.1. Background and Brief

Eskom identified an area of ± 35 km^2 on the Cape West Coast for the establishment of a wind energy facility. The facility is proposed to accommodate up to 100 turbines (hub height approximately 80 m, 90 m diameter rotor (3 x 45 m blades)), a concrete foundation of 15 m x 15 m for each turbine, an access road to the site from the main road/s within the area, an internal access road to access each wind turbine approximately 6 m in width, a substation (with underground distribution/cabling to each wind turbine), overhead powerline (132 kV distribution line) feeding into the electricity distribution network/grid, possibly a small office building and visitors centre at the facility entrance.

A scoping study of the area identified for the establishment of a wind energy facility must be undertaken. The scoping report must include:

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility.
- A description and evaluation of environmental issues and potential impacts (including direct, indirect and cumulative impacts) that have been identified.
- Direct, indirect and cumulative impacts of the identified issues must be evaluated within the Scoping Report in terms of the following criteria:
  - » the nature, which shall include a description of what causes the effect, what will be affected and how it will be affected;
  - » the extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international.
- A statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts.
- Recommendations regarding further studies required within the EIA phase, where necessary.

The aim of this report is to provide the required information for terrestrial fauna, excluding birds. The conclusions provided are largely based on information obtained from the literature and previous surveys in the coastal area immediately to the north of the study area (e.g., De Villiers, 1990; Picker, 1990; Rautenbach, 1990; Mouton & Alblas, 2003; Mouton *et al*., 2007). The study conforms to the requirements of Section 33 of the EIA Regulations in terms of the National Environmental Management Act (NEMA; Act No 107 of 1998) published in Government Notice R385. This study is also in line with the Western Cape DEA&DP guideline/requirements.

2. STUDY AREA

2.1. Study area

At the smallest spatial scale, the study area encompasses the coastal zone between Brand-se-Baai and the Olifants River mouth (the N7 forming the eastern perimeter), and at the largest spatial scale which is relevant to the environmental impact assessment, the study area (referred to as the broader study area in the report) includes the area between 29° and 32°S and west of 20° E.

2.2. Site description

Within the study area, an area within the Matzikama Local Municipality and the WCMA01 has been selected as potentially suitable for the establishment of a wind energy facility (referred to as the proposed site in the report) (Figure 1). The area of ± 35 km^2 comprises the following farms:

» Portion 5 of the farm Gravewaterkop 158
» Portion 620 of the farm Olifants River Settlement
» Portion 617 of the farm Olifants River Settlement

The western perimeter of the area is ± 2 km from the coast. The altitude of the area is roughly 100 m above sea level. Large parts of the area have been transformed for agricultural purposes (Figure 2). The vegetation is mainly Namaqualand Strandveld and Namaqualand Sand Fynbos (Figure 3) (Mucina & Rutherford, 2006).

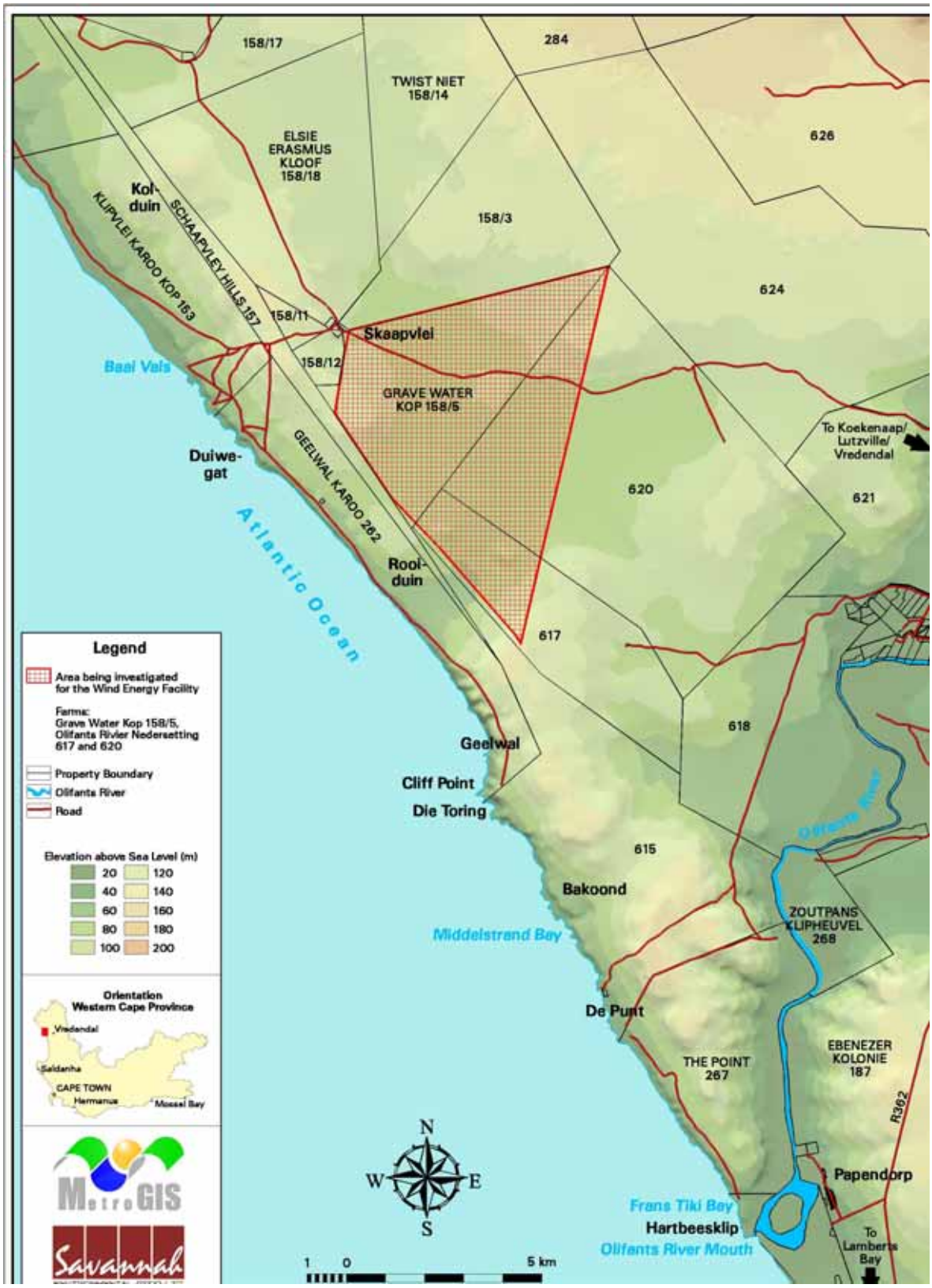

Figure 1. Location of the potential site in the study area for the establishment of a wind energy facility

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1. Phytogeographical setting

The study area is located within the Succulent Karoo Biome. The Succulent Karoo is the only arid region recognized as a world biodiversity hotspot (Mittermeier *et al*., 2000). Stretching along the Atlantic coast of Africa, from southwestern South Africa into southern Namibia, this biodiversity hotspot covers 116 000 km^2 of semi-desert. It is one of the 25 richest and most threatened reservoirs of plant and animal life on Earth. The Succulent Karoo boasts the world's richest succulent flora (Mucina & Rutherford, 2006), as well as high reptile and invertebrate diversity. Compared to other hotspots, the vegetation remains relatively intact (Mucina & Rutherford, 2006), yet only 30,000 km^2 of the original vegetation remains in a relatively pristine state. Only 5.8% of the hotspot is formally conserved (Mucina & Rutherford, 2006). Nearly one-third of the floral species of the region is unique to the hotspot.

The hotspot is vulnerable to several land use pressures, particularly overgrazing on communal lands, ostrich farming in the southeast, mining, and the illegal collection of plants and animals for trade. Climate change is expected to have a serious impact on the region's biodiversity (Mucina & Rutherford, 2006).

The 20-year conservation targets that have been identified thus far for the Succulent Karoo are:

- Seventy-five percent of the conservation targets set in the Succulent Karoo Ecosystem Programme process for 135 vegetation types will be protected and conserved.
- Key climatic gradients and riverine corridors are taken into consideration in the creation or expansion of any protected areas.
- Globally threatened and endangered species listed in the Red Data sources will be under additional protection.
- Sites in the Succulent Karoo hotspot that house unique, endemic and globally threatened species will be identified and protected.

Namaqualand is a relatively mild desert where extremes are tempered by its proximity to the cold, upwelled waters of the Benguela Current (Desmet & Cowling, 1999a). Most of the area receives a winter rainfall of less than 150 mm per annum (Cowling *et al*., 1999). This low rainfall is highly predictable and prolonged droughts are rare (Desmet & Cowling, 1999a). Along the coastal margin, the meagre rainfall is supplemented by highly predictable coastal fog and copious dewfalls are widespread. Temperatures are relatively mild throughout the year, especially along the coast, but high temperatures of

up to 40ºC may occur during winter when hot, turbulent air known as 'berg winds' descends coastward from the high altitude plateau of southern Africa (Cowling *et al*., 1999).

The coastal topography around the study area is generally flat across a 40 km wide stretch of coastal lowland, which terminates against the mountain land of the Namaqua Metamorphic Province (Cowling *et al*., 1999). The coast south of Island Point is essentially straight and is generally rocky with a few sandy beaches. A thick blanket of riverine and wind blown sand (up to 30 m thick) covers most of the coastal plain (Desmet & Cowling, 1999b).

Mucina & Rutherford (2006) identify two vegetation types within the study area, namely Namaqualand Strandveld and Namaqualand Sand Fynbos. The biggest threat to Namaqualand Strandveld is coastal mining for heavy metals (Mucina & Rutherford, 2006). None of the area is conserved in a statutory conservation area, but some small private reserves protect some of its vegetation. This vegetation is generally subject to extensive grazing, but erosion is very low. The ecosystem status of Namaqualand Sand Fynbos is "least threatened" and only about 2% has been transformed for cultivation (Mucina & Rutherford, 2006). This vegetation type is subject to extensive sheep grazing.

3.2. Potential occurrence of rare and endangered fauna species in the broader study area

3.2.1. Invertebrates

The mollusc (*Trichonephrus rocaceae*) is extremely abundant in the study area. The *Trichonephrus* species complex along the western coastal regions of South Africa is in urgent need of revision and there may be more than one species present in the study area (W.F. Sirgel, *pers. comm*.). The insect fauna of the area remains poorly known. The huge number of species involved and the problem of seasonality imposes considerable limitations on insect surveys of short duration. The survey of Picker (1990) has not revealed the presence of any rare or threatened species of insect in the immediate vicinity of the Namakwa Sands mine site, which is approximately 30 km to the north of the study area. The applicability of this finding will be determined through more detailed site surveys during the EIA Phase. Picker (1990) is of the opinion that more detailed surveys may yield new beetle and lycaenid butterfly species. However, from information available at this time (Ball, 2005), no butterfly species of conservation concern occurring in the broader study area are listed.

3.2.2. Amphibians

Sixteen frog species occur in the area between 29º-32ºS and west of 20ºE (Minter *et al.,* 2004). Of these, only three are Red Data species. The Desert Rain Frog (*Breviceps macrops*), listed as *Vulnerable*, occupies a narrow coastal strip along the northwestern Namaqualand coast from Alexander Bay southward as far as the farm Skulpfontein north of Koingnaas (Minter *et al*., 2004). It inhabits coastal sand dunes vegetated by low succulent shrubs. The Desert Rain Frog is not expected to be present in the study area for the proposed wind energy facility. The Namaqua Stream Frog (*Strongylopus springbokensis*), also listed as *Vulnerable*, occurs from the Orange River valley southward through Namaqualand to Garies. This frog is restricted to the proximity of springs and other permanent and non-permanent water bodies (Minter *et al*., 2004). It is seemingly absent from the immediate coastal regions (Minter *et al*., 2004). The Karoo Caco (*Cacosternum karooicum*) is listed as *Data Deficient* and is endemic to the arid Karoo regions of the Western and Northern Cape Provinces. It occurs more inland and although the most northerly record is in the Vanrhynsdorp district, it has not yet been recorded close to the coast. It is therefore not expected to be present in the study area for the proposed wind energy facility.

Of the 16 species occurring in the broader study area, only the Namaqua Rain Frog (*Breviceps namaquensis*) and the Namaqua Caco (*Cacosternum namaquense*) potentially occur within the study area. The Karoo Toad *(Bufo gariepensis*) may be present further inland. The Namaqua Rain Frog breeds terrestrially, i.e., there is no larval stage and no water body is required for breeding. The Namaqua Caco, on the other hand, needs at least a temporary water body for breeding. None of the three species potentially occurring in the study area are classified as Red Data species (Minter *et al*., 2004).

3.2.3. Reptiles

At least four chelonian, 39 lizard and 22 snake species occur in the area between 29º-32ºS and west of 20ºE (Branch, 1998). From the literature (Branch, 1998) and from previous sampling in the Namakwa Sands area at Brand-se-Baai (De Villiers, 1990; Mouton & Alblas, 2003), it is apparent that 44 reptile species may occur in the present smaller study area (Tables 3.1 and 3.2).

Baard *et al.* (1999) list nine of the reptile species potentially occurring in the smaller study area as Red Data species (Tables 3.1, 3.2). Of these, three are classified as *Vulnerable*:

i) Lomi's Blind Legless Skink (*Typhlosaurus lomii*) is found in sand dunes along the West Coast. It is threatened due to habitat destruction from alluvial

diamond mining. This species was recorded in the inland Succulent Karoo habitat just south of Groenriviermond (Mouton *et al.,* 2007) and it may be present further south as far as the present study area.

ii) Due to its gregarious nature (big family groups) and popularity as a pet, the Armadillo Girdled Lizard (*Cordylus cataphractus*) is vulnerable to over-exploitation for the pet trade (Mouton *et al*., 1987). This species requires high levels of solar radiation and will not be present close to the coast. It is not expected to be present on the proposed site for the wind farm.

iii) The Namaqua Dwarf Adder (*Bitis schneideri*) prefers semi-stable, vegetated coastal sand dunes and its habitat along the coast is threatened by mining activities (Branch, 1998). At Namakwa Sands, this species was recorded in the inland Succulent Karoo habitat (J. Blood, personal communication) and it may be present in the present study area.

Two lizard species potentially occurring in the study area are classified as *Lower Risk*, because of their restricted ranges or low numbers (Baard *et al*., 1999) (Table 3.1):

i) The Large-scaled Girdled Lizard (*Cordylus macropholis*) has a relatively restricted range along the West Coast. It is a habitat specialist and is vulnerable to over-collection and habitat degradation. The preferred microhabitat of this species is the succulent plant, *Euphorbia caput-medusae* (and related species). The lizard shelters between the stems of this plant, but may, however, also shelter underneath limestone rocks and debris of various sorts. It is unlikely that dense *E. caput-medusae* stands are present on the proposed site for the erection of a wind energy facility.

ii) The Namaqua Plated Lizard (*Gerrhosaurus typicus*) has an extensive range in South Africa, but is nowhere very common. Its main threat is habitat destruction (Baard *et al*., 1999). Although this species was not recorded during a survey at Namakwa Sands, there is a strong possibility that it may occur in the general area, as it has been recorded in Succulent Karoo habitat elsewhere in the broader study area (CapeNature Database). Because of its secretive nature, it will only be possible to confirm its presence in a given area by setting pitfall traps.

Four reptile species occurring in the broader study area are listed as *Data Deficient* (Baard *et al*., 1999) (Table 3.1, 3.2), namely Cuvier's Blind Legless Skink (*Typhlosaurus caecus*), Austen's Thick-toed Gecko (*Pachydactylus austeni*), the Rough Thick-toed Gecko (*Pachydactylus rugosus*), and the Speckled Padloper tortoise (*Homopus signatus cafer*). These species are considered to be threatened, but lack of information does not allow more conclusive evaluations. Of these, the first two may occur in the study area and on the proposed site, since elsewhere along the West Coast they have been recorded in

similar coastal Succulent Karoo habitat (CapeNature Database). The latter two are associated with inland rocky habitat and are not expected to be present on the proposed site.

Table 3.1. Lizards potentially occurring in the study area. The conservation category of sensitive and/or threatened species are provided, following (Baard *et al.*, 1999).

Species	**Common name**	**IUCN category**
Acontias lineatus	Striped Legless Skink	
Acontias litoralis	Coastal Legless Skink	
Typhlosaurus caecus	Cuvier's Blind Legless Skink	Data Deficient
Typhlosaurus lomii	Lomi's Blind Legless Skink	Vulnerable
Typhlosaurus vermis	Boulenger's Dwarf Burrowing Skink	
Scelotes sexlineatus	Striped Dwarf Burrowing Skink	
Trachylepis capensis	Cape Skink	
Trachylepis sulcata	Western Rock Skink	
Trachylepis variegata	Variegated Skink	
Meroles ctenodactylus	Smith's Desert Lizard	
Meroles knoxii	Knox's Desert Lizard	
Nucras tessellata	Western Sandveld Lizard	
Pedioplanis lineoocellata	Spotted Sand Lizard	
Cordylosaurus subtessellatus	Dwarf Plated Lizard	
Gerrhosaurus typicus	Namaqua Plated Lizard	Lower risk
Cordylus cataphractus	Armadillo Girdled Lizard	Vulnerable
Cordylus macropholis	Large-scaled Girdled Lizard	Lower Risk
Cordylus polyzonus	Karoo Girdled Lizard	
Agama sp nov.	Southern Rock Agama	
Agama hispida	Southern Spiny Agama	
Bradypodion occidentale	Namaqua Dwarf Chameleon	
Pachydactylus austeni	Austen's Thick-toed Gecko	Data Deficient
Pachydactylus formosus	Rough Thick-toed Gecko	Data Deficient
Chondrodactulus angulifer	Giant Ground Gecko	
Goggia lineata	Striped Dwarf Leaf-toed Gecko	
Pachydactylus bibronii	Bibron's Thick-toed Gecko	
Pachydactylus labialis	Western Cape Thick-toed Gecko	
Pachydactylus geitje	Ocellated Thick-toed Gecko	
Pachydactylus mariquensis	Marico Thick-toed Gecko	
Pachydactylus weberi	Weber's Thick-toed Gecko	

Table 3.2. Tortoises and snakes potentially occurring in the study area. The conservation category of sensitive and/or threatened species are provided, following (Baard *et al.*, 1999).

Species	Common name	IUCN category
TORTOISES		
Homopus signatus cafer	Speckled Padloper	Data deficient
Chersina angulata	Angulate Tortoise	
Psammobates tentorius trimeni	Tent Tortoise	
SNAKES		
Rhinotyphlops lalandii	Delalande's Beaked Blind Snake	
Lamprophis guttatus	Spotted House Snake	
Pseudaspis cana	Mole Snake	
Prosymna sundevalli	Sundevall's Shovel-snout Snake	
Psammophis leightoni namibiensis	Namib Fork-marked Sand Snake	
Psammophis notostictus	Karoo Sand Snake	
Dasypeltis scabra	Common Egg-eater	
Aspidelaps lubricus	Coral Snake	
Naja nivea	Cape Cobra	
Bitis cornuta	Many-horned Adder	
Bitis schneideri	Namaqua Dwarf Adder	Vulnerable

3.2.4. Mammals

Sixty-six mammal species, 11 of which are listed as Red Data species, occur in the area between 29º-32ºS and west of 20ºE (Friedmann & Daly, 2004). Rautenbach (1990) recorded 19 mammal species and confidently expects a further 16 species to occur in the Namakwa Sands mining area at Brand-se-Baai, 30 km to the north of the proposed site (Table 3.3). Most of these species are also expected to occur in the present study area as the habitat is very similar. The 35 species include six insectivores, four bats, two hare/rabbit species, 10 rodents, one felid, three canids, one mustelid, five viverrids, the dassie, and two antelope species.

Only two of the 11 Red Data species occurring in the broader study area, may be present in the study area:

i) Grant's Golden Mole (*Eremitalpa granti*), is listed as *Vulnerable* (Friedmann & Daly, 2004), but Rautenbach (1990) is of the opinion that this species cannot be considered as rare, vulnerable or endangered as it is quite common along the western coastal regions from Langebaan to the Namib desert. In the Namakwa Sands mining area, Rautenbach (1990) recorded this species in both the coastal white sand dunes and inland red sand dunes.

ii) Namaqua Dune Mole-rat (*Bathyergus janetta*), is listed as *Near Threatened* (Friedmann & Daly, 2004). The present study area lies at the southern limits of its known range (Friedmann & Daly, 2004) and its presence in the study area is unconfirmed.

The coastal rocky outcrops in the study area are probably too small and too isolated to support viable populations of rockdwelling mammals such as the Cape Rock Elephant Shrew (*Elephantulus edwardii*), the Rock Dormouse (*Graphiurus platyops*), the Spectacled Dormouse (*G. ocularis*), and Smith's Red Rock Rabbit (*Pronolagus rupestris*). It is concluded that the study area contains no unique or important mammalian habitats relative to the surrounding West Coast area. Furthermore, the area appears to have low species diversity.

3.3. Faunal habitats in the study area

Four main faunal habitats were identified in the study area: i.e. coastal strip, rocky habitat, white coastal dunes, and inland Succulent Karoo (Namaqualand Sand Fynbos and Namaqualand Strandveld). The coastal strip is a mixture of alternating fine grain sandy beaches and rocky shoreline. At a few locations, rocks extend to well above the high water mark, constituting a distinct habitat for rock-dwelling animal species. The white coastal sand dunes include both vegetated and exposed ones. The inland areas feature low to moderate relief and short xeric Succulent Karoo vegetation on red aeolian sand. The proposed site for the erection of the wind energy facility only offers one faunal habitat type, namely Succulent Karoo on red aeolian sand (Figure 3).

Table 3.3. Mammal species that are confidently expected to occur in the study area (Rautenbach, 1990; Skinner & Smithers, 1990; Friedmann & Daly, 2004).

Species name	Common name	Conservation category
Myosorex varius	Forest Shrew	
Crocidura cyanea	Reddish-grey Musk Shrew	
Suncus varilla	Lesser Dwarf Shrew	
Macroscelides proboscideus	Round-eared Elephant Shrew	
Chrysocloris asiatica	Cape Golden Mole	
Eremitalpa granti	Grant's Golden Mole	Vulnerable
Eptesicus hottentotus	Long-tailed Serotine Bat	
Eptesicus capensis	Cape Serotine Bat	
Tadarida pumila	Little Free-tailed Bat	
Tadarida aegyptiaca	Egyptian Free-tailed Bat	
Otocyon megalotus	Bat-eared Fox	
Vulpes chama	Cape Fox	
Canis mesomelas	Black-backed Jackal	
Ictonyx striatus	Striped Polecat	
Genetta genetta	Small-spotted Genet	
Genetta tigrina	Large-spotted Genet	
Suricata suricatta	Suricate	
Cynictis penicillata	Yellow Mongoose	
Galerella pulverulenta	Small Grey Mongoose	
Felis sylvestris lybica	African Wild Cat	
Procavia capensis	Rock Hyrax	
Sylvicapra grimmia	Common Duiker	
Raphicerus campestris	Steenbok	
Bathyergus suillus	Cape Dune Mole-rat	
Bathyergus janetta	Namaqua Dune Mole-rat	Near Threatened
Cryptomys hottentotus	Common Molerat	
Hystrix africaeaustralis	Porcupine	
Otomys unisulcatus	Bush Karroo Rat	
Gerbillurus paeba	Hairy-footed Gerbil	
Tatera afra	Cape Gerbil	
Aethomys namaquensis	Namaqua Rock Mouse	
Malacothrix typica	Large-eared Mouse	
Dendromys melanotus	Grey Climbing Mouse	
Steatomys krebsii	Kreb's Fat Mouse	
Rhabdomys pumilio	Striped Mouse	
Mus minutoides	Pygmy Mouse	
Lepus capensis	Cape Hare	
Lepus saxatilis	Scrub Hare	

Figure 2. The north-eastern part of the proposed site has been transformed for cultivation.

Figure 3. Namaqualand Strandveld vegetation in the study area.

4. ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

4.1. Identification of risk sources

From the previous sections, it is clear that numerous reptile and mammal species potentially occur in the study area and that many of them may be present on the proposed site for the erection of the wind energy facility, but that only a few are of conservation concern. Only three frog species are expected to be present in the study area, none of which are of conservation concern. Very little information is available on invertebrates, but there are no Red Data invertebrate species expected to occur in the study area.

The establishment of a wind energy facility and associated infrastructure (access road and powerline) could affect fauna in various ways. Those species that cannot effectively vacate the affected areas by themselves during the construction phase of the wind energy facility, e.g., invertebrates, tortoises, burrowing lizards and burrowing mammals, would potentially suffer direct mortality. The construction of the wind energy facility and associated infrastructure will inevitably result in the loss of faunal habitat. Traffic on the access road to and from the facility would most likely result in elevated numbers of road kills, and the roads themselves, as well as fencing, may pose significant barriers to animal movement. Bats occurring in the area may potentially suffer mortality from the rotor blades of the turbines when these animals forage at night. The significance of these potential impacts will in part be determined by the number of species of conservation concern actually present in the affected areas.

4.2. Risk assessment

The evaluation of impacts is based on the available information and will, where required, be verified through more detailed site surveys during the EIA Phase.

4.2.1. Direct mortality

Birds, large snakes and medium-sized mammals would be able to flee the affected areas at the start of site clearing and/or construction associated with establishing the infrastructure for the wind energy facility. Tortoises and many other reptiles, as well as amphibians and small mammals, will not be able to flee effectively, either because they are too slow or because they are predisposed to take shelter, and would therefore be directly impacted on by site clearing and excavations. Several species potentially occurring in the areas to be affected, are fossorial and will also not be able to flee. With the exception of the Angulate Tortoise (*Chersina angulata*), the Variegated Skink

(*Trachylepis variegata*), Knox's Sand Lizard (*Meroles knoxii*), the Bush Karoo Rat (*Otomys unisulcatus*), and the Striped Mouse (*Rhabdomys pumilio*), which generally occur in high numbers, population densities of other species in the study area are low. The presence of Red Data species on the proposed site and other areas in the study area to be affected by the erection of a wind energy facility, has not been confirmed. All other species occurring in the study area and which would suffer direct mortality have wide distributions in South Africa.

Due to the relatively small area that would be affected, the impact of direct mortality on species would only be of local extent. The impact would be of short duration. Because of the low densities of most species which would be affected, the intensity of the impact would also be low. The probability that faunal species would suffer direct mortality during site clearing is high. Because of the short duration and low intensity at a local scale, the potential impact of direct mortality is, however, considered to be of very low significance. The absence of Red Data species on the proposed site needs to be confirmed. The presence of one or more Red Data species may influence the above significance rating, depending on population densities of the Red Data species.

Removal of animals from the affected areas before the start of site clearing/ construction and relocating them to safe areas would only be a valid mitigation option in the case of tortoises. All other reptile and small mammal species are extremely difficult to catch and it would be a futile attempt to try and relocate them.

4.2.2. Loss of faunal habitats

Of the four faunal habitats identified in the study area, the inland Succulent Karoo (Namaqualand Sand Fynbos and Namaqualand Strandveld) is the only habitat that will be affected by the proposed project. This habitat type has a considerable geographic extent along the west coast and no vertebrate species are specifically associated with it. It follows that the inland vertebrate fauna of the study area is not unique in any significant sense. The chances that the Succulent Karoo habitat of the proposed site and of other areas in the study area to be affected by the project, contains any Red Data species are small. The Namaqua Dwarf Adder (*Bitis schneideri*), and Grant's Golden Mole (*Eremitalpa granti*), if present in the area, are expected to occur in the white coastal dunes and not inland (at Namakwa Sands, J. Blood, however, recorded the adder further inland). Just south of Groenriviermond, Mouton *et al*. (2007) also recorded Lomi's Blind Legless Skink (*Typhlosaurus lomii*) in Namaqualand Strandveld.

In light of the above-mentioned, the impact of habitat destruction would only be of local extent. Given the low faunal species diversity in the inland Succulent Karoo habitat and

the low probability of more than one endemic Red Data species occurring in this habitat, the intensity of the impact would be low. The probability of some impact on faunal species is high, but because the impact would be localised and of low intensity, the significance of the impact would be low. The degree of confidence in predicting the impact is high.

4.2.3. Increased road kill rate

Two important impacts of the South African road system on terrestrial fauna in general are that of road kills and dispersal barriers. During the last three decades, collisions with vehicles probably overtook hunting as the leading direct human cause of vertebrate mortality on land (Forman & Alexander, 1998). Amphibians and reptiles tend to be particularly susceptible on two-lane roads with low to moderate traffic. Large and mid-sized mammals are especially susceptible on two-lane, high speed roads, and birds and small mammals on wider, high-speed highways (Romin & Bissonette, 1996). Worldwide, studies have shown that despite high mortality on roads, road kills in general do not significantly impact populations and are apparently significant only for a few species listed as nationally endangered or threatened.

In the study area, the Red Data species which may be present in the area, Lomi's Blind Legless Skink (*Typhlosaurus lomii*), the Namaqua Dwarf Adder (*Bitis schneideri*), and Grant's Golden Mole (*Eremitalpa granti*), would not be affected to any large degree by road kills as the skink and the mole are subterranean species and the adder has low mobility. Grant's Golden Mole would probably only on occasion attempt to cross roads. Most road kills of small mammals occur at night when they are blinded by the lights of oncoming traffic. The existing access route to the site via Koekenaap (see Figure 1) would be considered as the first option for providing access to the site, and modifications will be made to the route where required. During the construction phase of the wind energy facility, the traffic volume on the access road will be high, but once the facility is operational the volume will be low.

Due to the above, the impact would only be of local extent. Because of the low faunal species diversity, low population densities, low traffic volume once operational, short distance over which the impact would be effective, and the possible absence of Red Data species, or, if present, low activity above ground, the intensity of the impact will be low. The probability of road kills is, however, high. Given the short-term duration of the impact (during construction only), the low intensity and the local scale, the impact would be of low significance.

4.2.4. Barrier effect access roads and fencing

In contrast to road kills, the barrier effect of roads probably affects more species than the effects of either road kills or road avoidance and may emerge as the greatest ecological impact of roads with vehicles (Forman & Alexander, 1998). While it is particularly mammals, with their greater mobility and larger home ranges, that are seemingly heavily impacted on by road kills, lower vertebrates and invertebrates, on the other hand, may find hard road surfaces impassable barriers. The access road to the wind energy facility, as well as the on-site service road, may form significant barriers preventing movement of small animals, particularly fossorial skinks (*Typhlosaurus lomii*, *T. vermis*, and *Acontias litoralis*). These species are, however, expected to have highest densities close to the coast and not inland. This may also be true for the Golden Moles (*Chrysocloris assiatica* and *Eremitalpa granti*). Of these species, only Lomi's Blind Legless Skink and Grant's Golden Mole are Red Data species.

Unlike roads, fencing would affect mammals, but not lower vertebrates and invertebrates. The site will probably be fenced, as Eskom will regard it as a National Key Point. Keeping small to large mammals out of the wind facility terrain after the construction phase is a question that needs to be addressed and will depend on the extent of remaining natural habitat present within the terrain. Small mammal predators may be necessary to keep rodent populations within the terrain under control.

Because of the low number of Red Data species that may be affected, the impact is anticipated to be of local extent and of low intensity. Because of the uncertainty whether the mentioned species will, in fact, be affected by a road, the impact must be considered of medium probability. Due to the long duration, but low intensity and local extent, the impact is anticipated to be of low significance.

4.2.5. Bat collision fatalities

At least four bat species are expected to frequent the study area (Table 3.3), none of which are of conservation importance (Friedmann & Daly, 2004). The Long-tailed Serotine Bat (*Eptesicus hottentotus*) is nowhere very common and seems to prefer broken or mountainous country and during the day roost in caves (Skinner & Smithers, 1990). The Cape Serotine Bat (*Eptesicus capensis*) has an extensive distribution in Africa. They roost in any available place, commonly in the roofs of houses (Skinner & Smithers, 1990). They readily come to lights at night to catch flying insects attracted to lights. The Little Free-tailed Bat (*Tadarida pumila*) is very similar in behaviour to the Cape Serotine Bat and also has an extensive distribution in Africa (Skinner & Smithers, 1990). The Egyptian Free-tailed Bat (*Tatarida aegyptiaca*) is gregarious and occurs in

large colonies. They roost in caves and rock crevices. Like the former two species, it has a wide distribution in Africa and is insectivorous (Skinner & Smithers, 1990).

Bat mortality at wind energy plants has been reported world wide (e.g., Johnson *et al*., 2003: Kerns & Kerlinger, 2004), but the intensity generally appears to be low and restricted to migrating bats rather than resident populations. Intensity of fatalities will probably vary seasonally and among species. Excessive lighting at the facility may also attract flying insects and therefore also bats, which may lead to increased mortality. Nevertheless, because the four species have extensive distributions elsewhere, the impact will only be of local extent. In light of the uncertainty whether the mentioned species will in fact be affected by the wind energy facility, the impact must be considered of medium probability. Due to the long duration, but expected low intensity and local extent, the impact should be considered of low significance.

4.3. Proposed methodology to assess potential environmental impacts in the EIA Phase.

Once the specific construction footprint for the establishment of the wind energy facility has been delineated within the proposed site, it will be important to conduct a ground survey of the terrestrial fauna present on the site, specifically to ascertain whether any of the Red Data species that potentially occur in the study area, are in fact present on the site. This information is needed to finalise the significance rating of potential impacts associated with the energy facility, in particular that of direct mortality and habitat loss. The survey also needs to identify areas within the proposed site that may be more sensitive than other parts in terms of animal occupation.

An assessment of the feasibility of pre-construction removal of animals from the site, based on numbers present on the site, should also be done. It should be possible to obtain substantial information by walking several representative transects on the site, searching for signs of animal occupation. Limited trapping for rodents will be required. Active searching for reptiles and amphibians, including raking under plants to locate fossorial lizards and snakes should be supplemented by the use of drift fences, pitfall- and funnel traps to locate secretive species such as the Namaqua Plated Lizard (*Gerrhosaurus typicus*). Although information on invertebrates occurring in the study area is very limited, a *detailed* survey of the invertebrate fauna of the site will in all probability not be possible within the time limits for the completion of an EIA. Nevertheless, every attempt should be made to identify all invertebrate species encountered on the site during the search for vertebrates.

The access road and powerline corridor alignment will have to be considered in more detail in the EIA phase, especially with respect to loss of faunal habitat or mortality of animal species of conservation concern.

5. DISCUSSION

From a terrestrial fauna perspective, there do not appear to be any major issues that may influence the siting of turbines. In various reports, coastal dunes have been highlighted as one of the most sensitive faunal habitats along the West Coast. The proposed site for the erection of the wind energy facility is sufficiently far inland not to affect this habitat type. Of the four faunal habitats identified in the study area, the wind energy facility will only impact on the inland Succulent Karoo habitat (Namaqualand Strandveld and Namaqualand Sand Fynbos). Because of its extent and homogenous nature, the inland Succulent Karoo habitat should be the least sensitive of the four habitats, although at least two Red Data reptile and one Red Data mammal species may be associated with it. It is important that a ground survey of the fauna of the proposed site be conducted to confirm the presence/absence of these Red Data species. Invertebrates (especially insects) of the West Coast area are still poorly known and will probably remain so until a detailed, long-term survey can be conducted. Most surveys that have been conducted in the area to date were associated with environmental impact assessments. These assessments normally have stringent time constraints and do not allow for long-term surveys.

The question of the impact that a wind energy facility will have on bats is a difficult one. Relatively few studies have investigated the impact that wind energy generation plants may have on bats. The ones that have been done in the US, however, found that wind turbines do not pose a significant threat to bat populations (Sagrillo, 2003). An important finding so far is that bat collision mortality during the breeding season is virtually non-existent, despite the fact that relatively large numbers of bat species have been documented in close proximity to wind energy generation plants. It appears as if wind farms do not impact resident breeding populations, but rather migrant or dispersing bats in the late summer and autumn. Migrant bats, since they are not searching for insects or feeding, probably 'turn off' their echolocation in order to conserve their energy resources. Preliminary data for the US also indicate that the populations of bats susceptible to turbine collisions are usually large enough that the observed mortality is not sufficient to cause population declines.

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