

**BOULDERS WIND FARM NEAR VREDENBURG:  
FAUNA & FLORA SPECIALIST SCOPING REPORT**



**PRODUCED FOR SAVANNAH ENVIRONMENTAL  
ON BEHALF OF VREDENBURG WINDFARM PTY (LTD)**



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**NEMA 2014 CHECKLIST**

Section		NEMA 2014 Regulations for Specialist Studies	Position in report (pg.)	check
1	1	A specialist report prepared in terms of these Regulations must contain—		
	(a)	details of-		
		(i) the specialist who prepared the report; and	4-5	✓
		(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;		
	(b)	a declaration that the person is independent in a form as may be specified by the competent authority;		✓
	(c)	an indication of the scope of, and the purpose for which, the report was prepared;	6	✓
	(d)	a description of the methodology adopted in preparing the report or carrying out the specialised process;	8-10	✓
	(e)	a description of any assumptions made and any uncertainties or gaps in knowledge;	8	✓
	(f)	a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment;	10-17	✓
	(g)	recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority;	20-23	✓
	(h)	a description of any consultation process that was undertaken during the course of carrying out the specialist report;	See main EIA report	✓
	(i)	a summary and copies of any comments that were received during any consultation process; and	See main EIA report	✓
	(j)	any other information requested by the competent authority.		
	2	Where a proposed development and the geographical area within which it is located has been subjected to a pre-assessment using a spatial development tool, and the output of the pre-assessment in the form of a site specific development protocol has been adopted in the prescribed manner, the content of a specialist report may be determined by the adopted site specific development protocol applicable to the specific proposed development in the specific geographical area it is proposed in.	N/A	✓

**PROFESSIONAL PROFILE OF CONSULTANT:**

Simon Todd is Director of 3Foxes Biodiversity Solutions and has extensive experience in biodiversity assessment, having provided ecological assessments for more than 150 different developments including a large number of power line developments. Simon Todd is a recognised ecological expert and is a past chairman of the Arid-Zone Ecology Forum and has 20 years' experience working throughout the country. Simon Todd is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

Recent experience and relevant projects include the following:

- Vryheid Grid Strengthening Project, near Swellendam. Nsovo Environmental Consultants. 2016.
- Juno-Gromis 400kV Power Line. Ecological Walk-Through study for EMPr. Nsovo Environmental Consultants. 2017.
- Proposed Weskusfleur Substation at Koeberg. Lidwala Consulting Engineers. 2015.
- Proposed Juno-Aurora 765kV Power Line in the Western Cape: Fauna & Flora Specialist Report for Impact Assessment. Nzumbulolo Heritage Solutions 2015.
- The proposed Mookodi Integration Phase 2 132kV Power Lines and Ganyesa Substation near Vryburg, North West Province: Fauna & Flora Specialist Basic Assessment Report. Sivest 2014.
- Burchell-Caprum-Moidraai 132kV Power Line - Fauna & Flora Specialist Report for Basic Assessment. Savannah Environmental 2014.
- Proposed Re-Alignment of The Koeberg – Ankerlig VPower Line: Fauna & Flora Specialist Report for Basic Assessment. Savannah Environmental 2014.
- Grid Connection for Mainstream South Africa Perdekraal Wind Energy Facility. Fauna & Flora Specialist Report for Basic Assessment. ERM 2014.
- Karoshoek Grid Integration Infrastructure. Fauna & Flora Specialist Report for Basic Assessment. Specialist Report for Savannah Environmental. 2012.
- Proposed Kappa-Omega 765 kV Transmission Line. Fauna, Flora & Ecology Walk-Through Report. Specialist Report for ACER Africa. 2013.

## **1 INTRODUCTION**

Vredenburg Windfarm Pty (Ltd) are proposing to develop the Boulders Wind Farm with a contracted capacity of up to 140MW located near to Vredenburg in the Western Cape Province. Vredenburg Windfarm Pty (Ltd) has appointed Savannah as the independent Environmental Assessment Practitioner (EAP) to undertake the required environmental authorisation process for the proposed Boulders Wind Farm. Savannah has appointed Simon Todd Consulting to provide a specialist terrestrial biodiversity Scoping Study of the project site as part of the EIA process.

The purpose of the Terrestrial Biodiversity Scoping Report is to describe and detail the ecological features of the proposed site; provide a preliminary assessment of the ecological sensitivity of the site and identify the likely impacts that may be associated with the development of the site as a wind farm. A desktop study and review of the available ecological information for the area was conducted in order to identify and characterise the ecological features of the site. This information is used to derive a draft ecological sensitivity map that presents the likely ecological constraints and opportunities for development at the site, which can then be verified and refined during the EIA phase. The information and sensitivity map presented here provides an ecological baseline that can be used in the planning phase of the development to ensure that the potential negative ecological impacts associated with the development can be minimised or avoided. Furthermore, the study defines the terms of reference for the EIA phase of the project and outlines a plan of study for the EIA which will follow the Scoping Study.

The full scope of study is detailed below.

### **1.1 SCOPE OF STUDY**

The scope of the study includes the following activities:

Conduct a desktop scoping study to broadly describe and characterise the project site in terms of:

- Vegetation types and/or habitats;
- National conservation status of major vegetation types;
- Red Data (threatened and endangered) flora and fauna species;
- The potential presence/absence of Red Data flora and fauna species;
  - The potential presence of trees protected according to the National Forests Act and fauna and flora protected under the National Environmental Management: Biodiversity Act;
  - The general status of vegetation on site; and
  - Potential impacts on biodiversity, sensitive habitats and ecosystem functioning.

Compile a scoping level biodiversity report including (but not limited to) the following aspects:

- Introduction;
- High level description of the environmental baseline;
- Assumptions and limitations;
- Methodology;
- High level identification and mapping of biodiversity (fauna and flora) sensitive areas within the proposed application (project) site;
- Potential anticipated impacts related to biodiversity (fauna and flora);
- Recommendations for further assessment; and
- Conclusion.

In addition this scoping study compared and reviewed the botanical EIA specialist Scoping study undertaken previously at the site (Bergwind 2011) to draw upon the findings.

### **1.2 RELEVANT ASPECTS OF THE DEVELOPMENT**

The Boulders Wind Farm is located approximately 8km north of Vredenburg, within the Western Cape Province (see Figure 1). At this stage it is proposed that the wind farm will have a total contracted capacity of up to 140 MW.



**Figure 1.** Satellite view of the boundary and farms within the proposed Boulders Wind Farm project site near Vredenburg, Western Cape.

### **1.3 LIMITATIONS & ASSUMPTIONS**

The current study is based on a desktop study and a review of the previous botanical study undertaken in 2011 for a previous EIA process within the project site. The presence of fauna must be evaluated based on the literature and available databases but in many cases, these databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many areas have not been well sampled with the result that the species lists derived for the area do not always adequately reflect the actual fauna and flora present at the site. This is acknowledged as a limitation of the study, however it is substantially reduced through extracting the species lists for a substantially larger area than the site and through the inclusion of information from the previous specialist study that was conducted at the site as well as previous experience in the wider area.

## **2 METHODOLOGY**

### **2.1 DATA SOURCING AND REVIEW**

Data sources from the literature consulted and used where necessary in the study includes the following:

*Vegetation:*

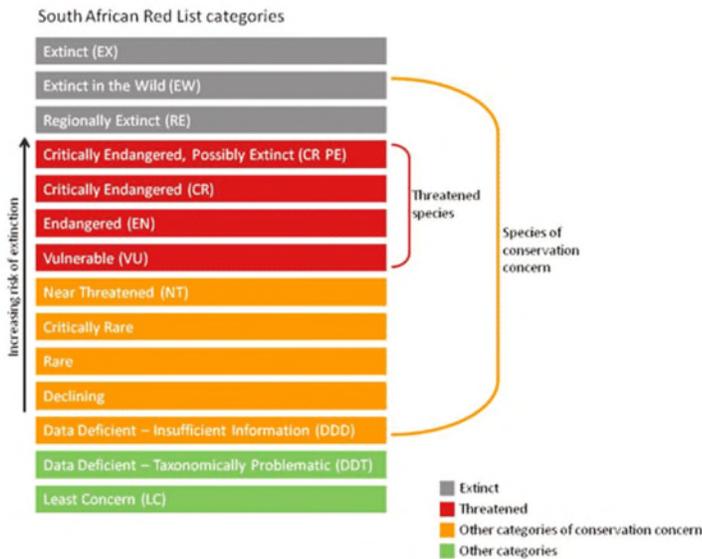
- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2012) as well as the Western Cape Biodiversity Spatial Plan (WCBSP) (2017), where relevant.
- Information on plant and animal species recorded for Quarter Degree Squares (QDS) 3218CC, 3318AA and 3217DD was extracted from the SABIF/SIBIS database hosted by SANBI. This is a considerably larger area than the project site, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself has not been well sampled in the past.
- The IUCN conservation status (Figure 2) of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2014).

*Ecosystem:*

- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important catchments and protected expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- Critical Biodiversity Areas were extracted from the 2017 Western Cape Biodiversity Spatial Plan (WCBSP).

*Fauna*

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and the ADU databases <http://vmus.adu.org.za>.
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, EWT, SANBI (2016) and Skinner and Chimimba (2005) for mammals.
- The faunal species lists provided are based on species which are known to occur in the broad geographical area (QDS 3218CC, 3318AA and 3217DD), as well as an assessment of the habitat in the area based on knowledge of the area from prior work done in the vicinity.
- The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria version 3.1 (2014) (See Figure 2) and where species have not been assessed under these criteria, the CITES status is reported where possible.



**Figure 2.** Schematic representation of the South African Red List categories. Taken from <http://redlist.sanbi.org/redcat.php>

**2.2 SENSITIVITY MAPPING & ASSESSMENT**

A draft ecological sensitivity map of the site was produced by integrating the results of previous site visits with the available ecological and biodiversity information in the literature and various spatial databases as described above. As a starting point, mapped sensitive features such as wetlands, drainage lines, rocky hills and pans were collated and buffered where appropriate to comply with legislative requirements or ecological considerations. Additional sensitive areas were then identified from the satellite imagery of the site and delineated. All the different layers created were then merged to create a single coverage.

Features that were specifically captured in the sensitivity map include drainage features, wetlands and pans, as well as rocky outcrops and steep slopes. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a low impact on ecological processes and terrestrial biodiversity. This category represents transformed or natural areas where the impact of development is likely to be local in nature and of low significance with standard mitigation measures.
- **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. 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 impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution 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.

### **3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE**

#### **3.1 BROAD-SCALE VEGETATION PATTERNS**

The national vegetation map (Mucina & Rutherford 2012) for the project site is depicted below in Figure 3. The majority of the site is mapped as falling within the **Saldanha Granite Strandveld** which occurs in the Western Cape Province, on the West Coast, on granite domes from Vredenburg to St Helena Bay and many points along the coast including Paternoster and Saldanha's North Head; also around Langebaan town and at Postberg on the Langebaan Peninsula. According to Mucina & Rutherford (2012), the vegetation consists of low to medium shrubland, containing some succulent elements, alternates with grassy and herb-rich spots supporting a rich geophyte flora.

The Saldanha Granite Strandveld vegetation is listed as Endangered (WCBS 2017) and out of the original 23 000ha, only 37% is left (DEA 2011). Almost 10% of the vegetation type is statutorily conserved in the West Coast National Park, SAS Saldanha and Columbine Nature Reserves, and a small portion in private reserves such as West Point, Groot

Paternoster and Swartriet. About 70% has been transformed for cultivation or by urban development. The vegetation type has 45 Red Data Book species and 15 endemics.

**Saldanha Flats Strandveld** occurs to a smaller extent on the western half of the site. This vegetation type is distributed in the Western Cape Province on extensive coastal flats from St Helena Bay and the southern banks of the Great Berg River near its mouth in the north to Saldanha and Langebaan in the south, with the southernmost extension at the coast near Yzerfontein and Rietduin (Mucina & Rutherford 2012). The vegetation consists of sclerophyllous shrublands built of a sparse emergent and moderately tall shrub layer, with an open succulent shrub layer forming the undergrowth and has conspicuous displays of geophytes and annual herbaceous flora in spring (Mucina & Rutherford 2012)..

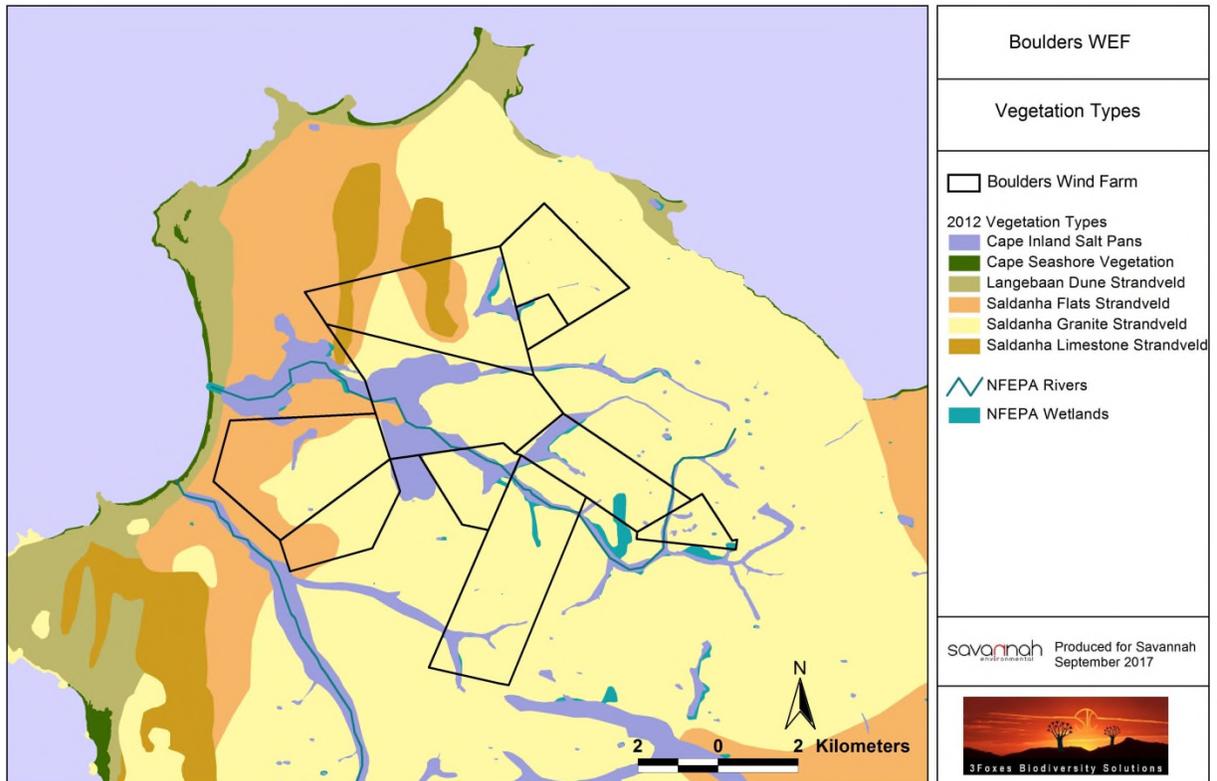
It is listed as Endangered (uplisted from the 2011 assessemnt of Vulnerable - WCBSP 2017) and some 11% statutorily conserved in the West Coast National Park and Yzerfontein Nature Reserve and a very small portion also in private conservation areas such as Jakkalsfontein and West Point (Mucina & Rutherford 2006). Only 48% of the original extent (76 000ha) remains (DEA 2011). More than a half has already been transformed for cultivation, road building or by urban development. It has 26 RDB species and at least 2 endemics (DEA 2011).

**Saldanha Limestone Strandveld** is distributed in the Western Cape Province over a very limited area with a larger patch on the Kliprug ridge between Saldanha and Paternoster, with several smaller outliers including those between Saldanha and north of Club Mykonos on the Langebaan Lagoon (Mucina & Rutherford 2006). It occurs on slightly undulating ridges and steeper coastal slopes supporting low shrublands built of low succulent-stemmed and deciduous, fleshy leaved shrubs in deeper soils. Patches of prostrate, succulent-leaved dwarf shrubs and annual or geophytic herbs occupy cracks or shallow depressions in the exposed limestone (Mucina & Rutherford 2006).

None of the vegetation type is conserved in statutory conservation areas and only a small fraction protected in the Swartriet Private Nature Reserve. About 40% has been transformed for cultivation or by development of coastal settlements. It is considered to be Least Threatened, but is nevertheless considered vulnerable to further habitat loss due the high exsting level of transformation and fragmentation

**Cape Inland Salt Pans** occupy the low-lying areas adjacent to the drainage systems on the site. This azonal vegetation type occurs in the Western and Eastern Cape (to smaller extent) Provinces, from Jakkalsrivier Valley between Graafwater and Lambert's Bay, Rocher Pan and other pans near Dwarskersbos (near Velddrif), Soutpan near Yzerfontein, Rondevlei, Paardevlei, Noordhoek (all near Cape Town), salt vleis of the Agulhas Plain, Zoutpan and several other smaller salt pans in the Albertinia region (Zoutpan, Melkhoutfontein, Vogelvlei). The vegetation occurs in small depressions dominated by low succulent scrub composed of creeping chenopods and salt-tolerant herbs and grasses.

These pans are considered Least Threatened (WCBS 2017) and 20% is statutorily conserved in the Agulhas and West Coast National Parks as well as in the Soetendalsvlei and Rocherpan Nature Reserves. However, as this ecosystem is associated with hydrological features and plays an important ecological role, it is considered sensitive to disturbance.



**Figure 3.** The national vegetation map (Mucina & Rutherford, 2006 & 2012 Powrie update) for the project site. Rivers and wetlands (pans) delineated by the National Freshwater Ecosystem Priority Areas Assessment (Nel et al. 2011) are also depicted.

### 3.2 FINE-SCALE VEGETATION PATTERNS

Based on the satellite imagery of the site as well as the previous report from Bergwind (2011) the majority of the area has been transformed for crop production (see Table 1) and there are few remnants of intact vegetation. Remaining intact areas are associated with granite domes, rocky granite outcrops and other areas unsuitable for cultivation. These areas are important in supporting viable natural ecosystems with many birds, small mammals and reptiles finding refuge there (Bergwind 2011). There are also some brackish wetlands, vleis and streams which should be protected but in general the area is in a degraded or transformed state. The most important recommendation the authors drew was that no turbines should be located in remnant patches of natural vegetation. If that could

be ensured, the anticipated impacts on natural vegetation would be Low Negative to Negligible.

**Table 1.** Habitat condition in the Boulders Wind Farm study area according to the Bergwind (2011) study. These results are confirmed by the independent sensitivity mapped conducted for the current study.

<b>Habitat Condition</b>	<b>Percentage of habitat condition class (adding up to 100%)</b>	<b>Description (poor land management practises, presence of quarries, grazing / harvesting regimes etc.)</b>
Natural	5%	Remnant Saldanha Granite Strandveld
Near Natural (includes areas with low to moderate level of alien invasive plants)	5%	Some invasion by alien plants and disturbance of soil
Degraded (includes area heavily invaded by alien plants)	5%	Limited areas of alien plants and degraded habitats since most areas are cultivated
Transformed (Includes cultivation, dams, urban, plantation, roads, etc.)	85%	Most of the arable land has been transformed by ploughing and cultivation

### **3.3 LISTED PLANT SPECIES**

Listed and protected species that occur in the wider area include 652 species, of which 11 are Critically Endangered, 33 are Endangered and 48 Vulnerable, indicating a very high proportion of species of special concern in the area. Given the high levels of transformation across most of the site, the species richness of most areas is likely to be low. However, where reasonably intact areas remain, there is a very high probability that there will be species of conservation concern present. As such the primary mitigation measure to reduce impact on species of concern is to avoid impact on the intact vegetation fragments.

**Table 1.** Conservation status of plant species known from the vicinity of the project site

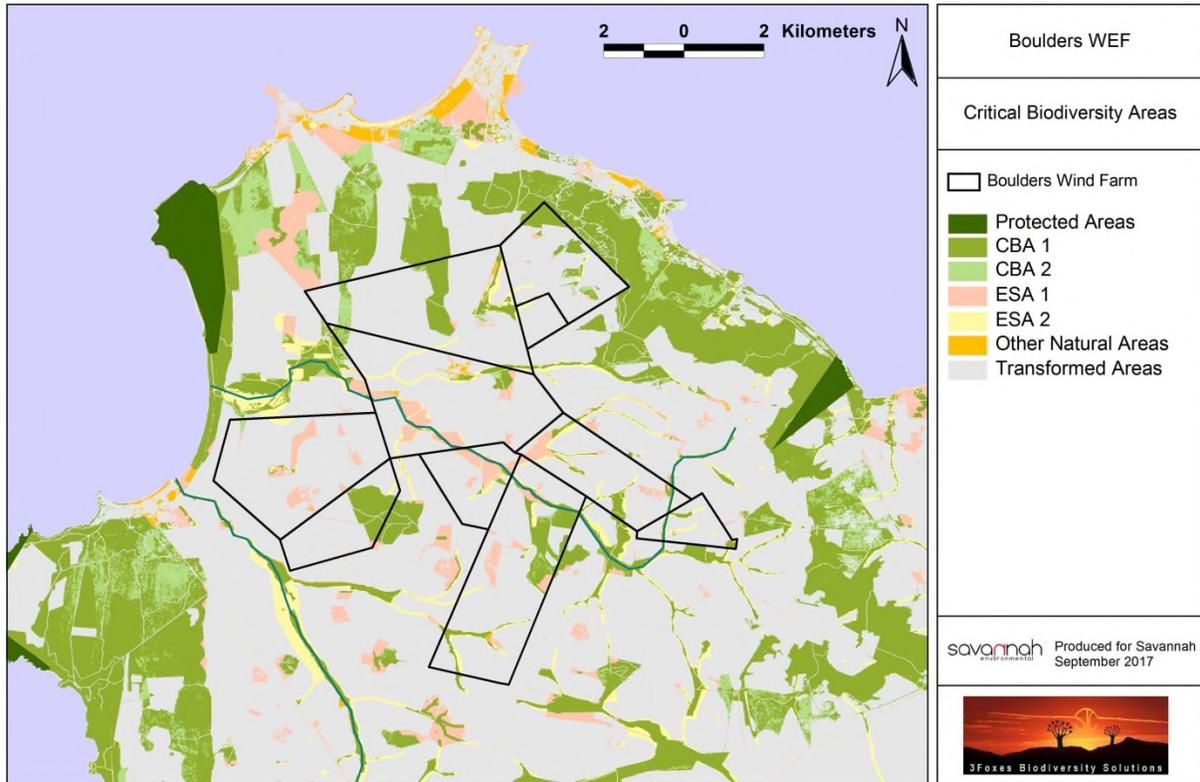
<b>IUCN Status</b>	<b>Count</b>
<b>CR</b>	11
<b>EN</b>	33
<b>VU</b>	48
<b>Thr*</b>	1
<b>NT</b>	37
<b>Rare</b>	0
<b>Declining</b>	4
<b>DDD</b>	4
<b>DDT</b>	4
<b>LC</b>	502
<b>Not Evaluated</b>	8
<b>Grand Total</b>	<b>652</b>

### **3.4 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES**

The site lies within the planning domain of the Western Cape Biodiversity Spatial Plan (CapeNature 2017). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represents biodiversity priority areas, and are considered to be 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. There are several CBAs within the wind farm site most of which are in a natural condition and their proposed objective for use is “*Maintain natural land. Rehabilitate degraded to natural or near natural and manage for no further degradation*” (WCBSP 2017). The Biodiversity Plan also indicates the known presence of plant species of conservation concern within the site, highlighting the potential significance of the intact vegetation fragments. The distribution and functioning of the CBAs is closely associated with the remaining intact areas and provided that impact on these areas can be minimised then a significant impact on CBAs and their ecological functioning is not likely. Some roads are however likely to cross the drainage features of the site and these crossings should be aligned with existing roads where possible.

The site does not lie within a National Protected Area Expansion Strategy (NPAES) focus area and has therefore not been identified as an important area for future conservation area expansion. An Important Bird Area (SA104) for the Berg River Estuary has been identified within 7km of the site. The site also falls within the Cape West Coast Biosphere Reserve, which extends from Milnerton in the south to Laaiplek in the north and as far inland as Malmesbury and Hopefield. There are no core areas within the site, although it is within areas that are buffer areas and transition zones. The buffer areas are natural or

transformed areas that generally coincide with the areas mapped as CBAs but are more broadly conceived in some areas, while the transition zones are transformed areas within the greater biosphere reserve which provide for contiguity between the core and buffer areas. As there would be no turbines within intact vegetation, there would be no additional habitat loss from the development and as such minimal impact on the Biosphere Reserve.

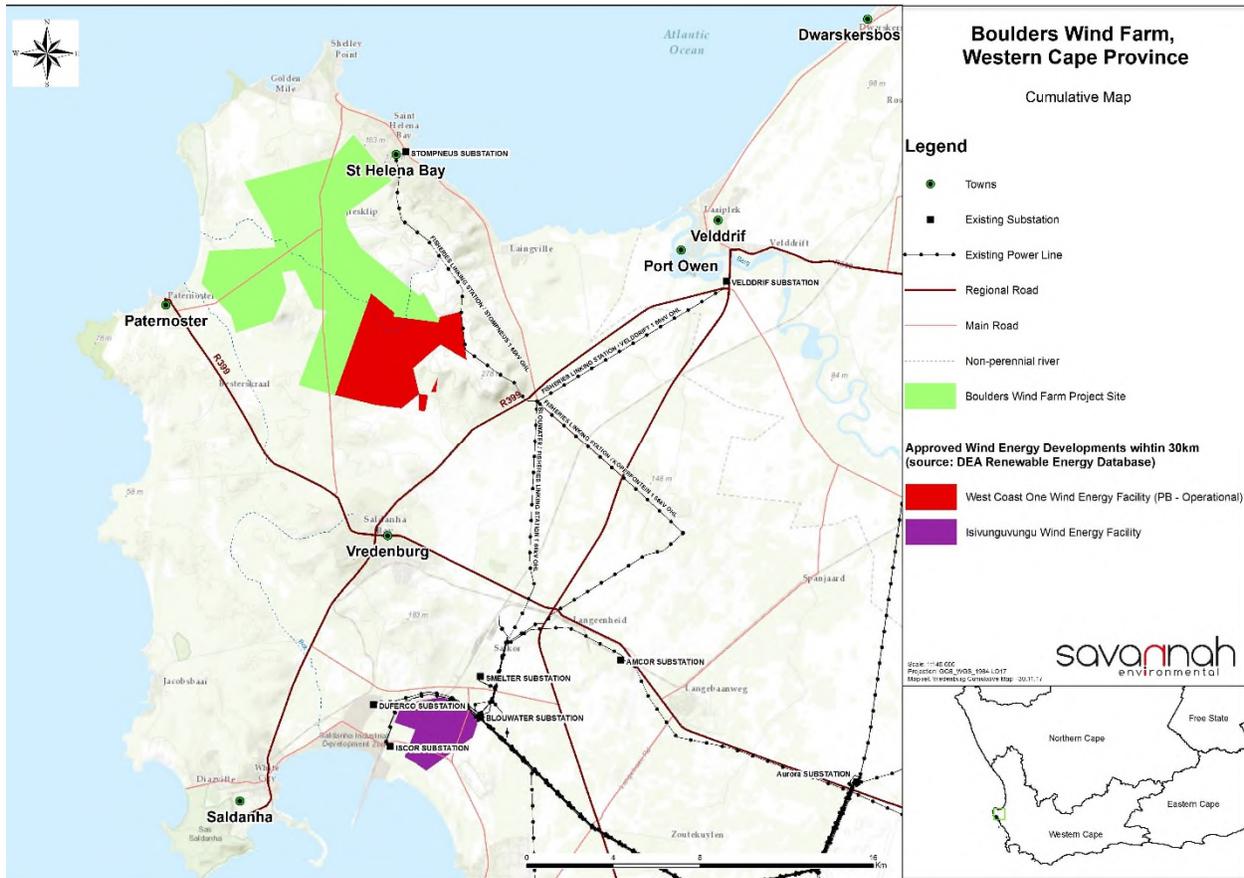


**Figure 4.** Extract of the Western Cape Biodiversity Spatial Plan for the project site, showing that while there are several CBAs within the Boulders Wind Farm site, these are of limited extent and correspond with the remaining areas of natural vegetation.

### 3.5 CUMULATIVE IMPACTS

In terms of existing impacts in the area and the potential for the Boulders Wind Farm to contribute to cumulative impacts, other renewable energy developments in the area are mapped below in Figure 5. As noted by the prior EIA authors, the Saldanha—Vredenburg area has lost much of the original vegetation due to agriculture with the result that most of the affected renosterveld vegetation types in the area are listed as threatened ecosystems. As such, additional impact on intact vegetation is highly undesirable and the listed vegetation types of the area are highly vulnerable to cumulative impact. However, the current proposed and adjacent existing 94MW ‘West Coast One Windfarm’ are located on

cultivated agricultural land where there is little remaining natural vegetation. As a result additional loss of vegetation due to the current can be minimised and there would be Low cumulative impacts on any natural vegetation or fauna due to the wind farms on the Saldanha-Vredenburg Peninsula.



**Figure 5.** Map illustrating the affected farm portions of known and approved wind energy projects within 30km radius of the Boulders Wind Farm project site (provided by Savannah Environmental).

### 3.6 FAUNAL COMMUNITIES

#### Mammals

The site falls within the distribution range of 47 terrestrial mammals (Annex 1), excluding conservation-dependent mammals such as Eland, bats and marine mammals, and potential mammalian diversity at the site is quite high. Listed mammal species which may occur at the site include the Grant's Golden Mole *Eremitalpa granti granti* (Vulnerable) of which 1 has been recorded in the general area, and Brown Hyaena *Hyaena brunnea* (Near Threatened) and Cape Clawless Otter *Aonyx capensis* (Near Threatened). As the otter could easily be using the wetlands and rivers, it would be worth investigating the presence of suitable habitat for this species during the EIA phase. The hyeana has a broad distribution across

South Africa, the relatively limited footprint of the development is not likely to compromise the local or regional populations of the species, especially given the very low density of such species in the area. Areas of sandy substrate of high quality golden mole habitat should be buffered from development.

### **Reptiles**

The site lies in or near the distribution range of at least 40 reptile species (Annex 2). This is a comparatively low total, suggesting that reptile diversity at the site is likely to be low. There are several listed species which could occur at the site. The Cape Dwarf Chameleon *Bradypodion pumilum* (Vulnerable) would be found in reed thatches, the Large-scaled Girdled Lizard *Cordylus macropholis* (Near Threatened) and the Black Girdled Lizard *Cordylus niger* (Near Threatened) would likely be found on rocky outcrops. However, listed species such as the Cape Sand Snake *Psammophis leightoni*, (Vulnerable), Gronovi's Dwarf Burrowing Skink *Scelotes gronovii* (Near Threatened), Kasner's Dwarf Burrowing Skink *Scelotes kasneri* (Near Threatened) and the Bloubergstrand Dwarf Burrowing Skink *Scelotes montispectus* (Near Threatened) are more likely to be located in extensive sandy soils. The loss of vegetation cover associated with roads and other cleared areas can generate significant impact on reptiles as they may be vulnerable to predation while crossing such cleared areas, and the loss of key habitats can cause impacts on reptile persistence in the landscape. However, given the already transformed nature of the site, impacts would be largely contingent on the extent to which intact areas could be avoided.

### **Amphibians**

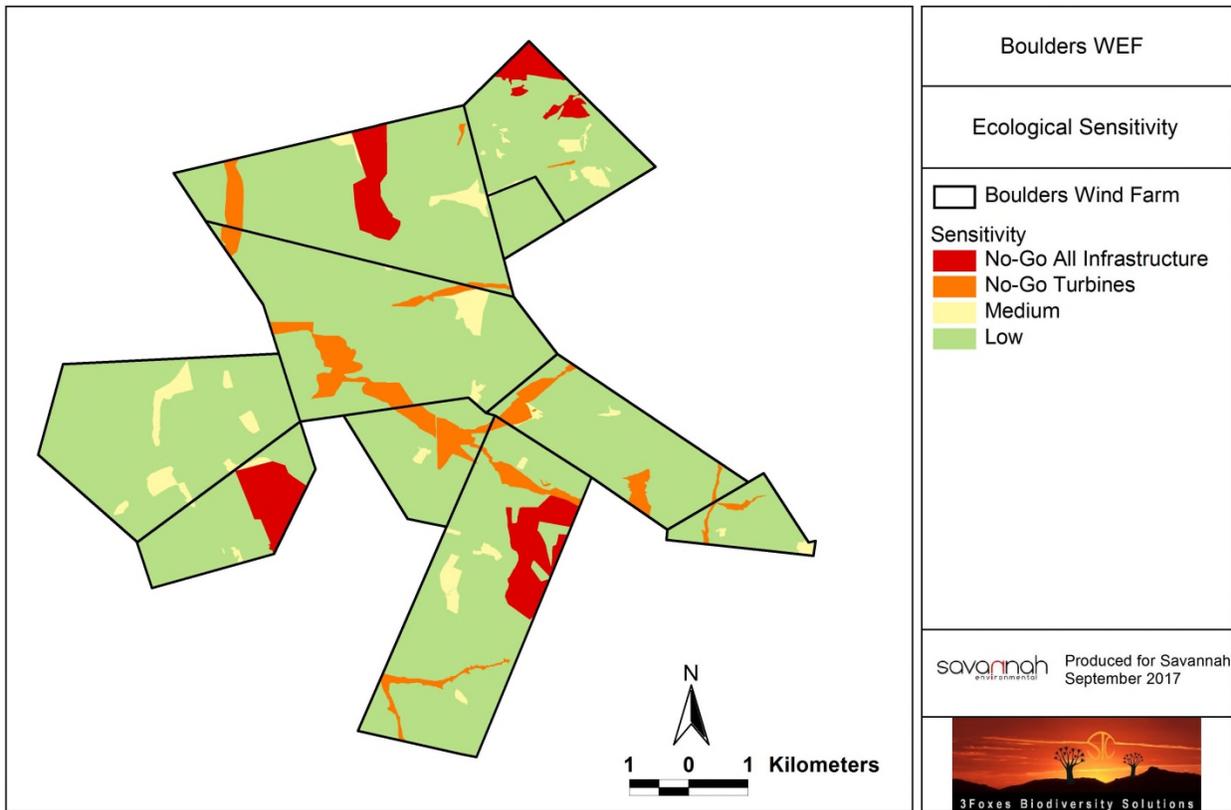
There are eight amphibians known from the area based on the ADU database. The only listed species which may occur in the area is the Cape Caco *Cacosternum capense* (Vulnerable). This species breeds in pans which occur in undulating low-lying areas with poorly drained loamy to clay soils, although it is known from some shallow sandy habitats (IUCN 2017) and therefore it could occur in the inland pan habitat. Impacts on amphibians are likely to be low given the transformed nature of the site and the low likely density of amphibians in the area, which are likely to have been impacted by degradation, salinization and the use of fertilizers and pesticides in the area.

## **4 Boulders Wind Farm Sensitivity Assessment**

The draft sensitivity map for the project site is depicted below in Figure 6. The majority of the site is transformed and considered to be low sensitivity. Development in these areas would generate very low ecological impacts. There are however many remanant vegetation patches of various size at the site which are considered to be of varying higher sensitivity. The smaller fragments are generally degraded as a result of overgrazing and other impacts related to their small size and are considered moderate sensitivity. Although degraded,

there may be listed species present in these areas and any development in these areas would need to ensure that no species of high conservation concern are affected. The larger intact areas are the only areas which retain a resemblance of the original ecological functioning and are considered Very High sensitivity and are considered no-go areas for development. A distinction is however drawn between areas where no development at all should occur and areas where roads and other linear infrastructure may be acceptable, especially if this can be aligned with existing disturbance.

Provided that the development can be restricted to the lower sensitivity areas, then the impact of the development on fauna and flora would be low. Significant impact on the larger intact fragments would however generate impacts that would be considered to be of very high significance.



**Figure 6.** Draft sensitivity map for the Boulders Wind Farm project site. There are several intact listed vegetation areas, scattered pans, rocky outcrops and drainage lines which are considered sensitive and which should be avoided as much as possible.

## 5 Identification of Potential Impacts

The development of the Boulders Wind Farm, is likely to result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and

faunal habitat to hard infrastructure such as turbine foundations and service areas, roads, operations buildings etc. The following impacts are identified as the major impacts that are likely to be associated with the development and which will be assessed during the EIA phase of the Boulders Wind Farm, for the preconstruction, construction and operation phases of the development. The following impacts are identified as the major impacts that are likely to be associated with the development and which are assessed for the facility:

1. Impacts on vegetation and protected plant species

The development may result in the further transformation and loss of intact vegetation. In addition, there are potentially plant species of conservation concern present within the intact fragments which would be impacted if any development were to occur in these areas. Impacts are however likely to be very low provided that no infrastructure is located within the areas considered to be no-go areas.

2. Degradation of ecosystems

The large amount of disturbance created during construction will leave disturbed parts of the site vulnerable to alien plant invasion and soil erosion. This is likely to be an issue following the construction phase as there would be a lot of disturbance and exposed soil present at the time which would be vulnerable to erosion. However, this would likely be restricted to transformed or degraded areas and with mitigation, the long-term impacts can likely be reduced to a low level.

3. Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna especially during construction. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. Chemical spills or waste that enter waterways could negatively impact amphibians. During operation, the turbines would generate noise and movement which may deter some fauna from their vicinity, but most species would be likely to become habituated in the long-term, especially as most fauna present is likely to be tolerant of human activity.

4. Impacts on Critical Biodiversity Areas and Broad-Scale Ecological Processes. The development will contribute to cumulative impacts in the area and potentially the ability to meet future conservation targets. In addition, the presence of the wind turbines and daily operational activities at the site may deter certain fauna species from the area, resulting in a loss in broad-scale landscape connectivity. In this regard it is important to note that while the development footprint will be limited in extent in comparison with the total extent of the

site, some fauna may be affected across a much wider area than the footprint due to noise and other effects which extend beyond the direct footprint of the development. Even the vegetation types which are considered to be of relatively low conservation priority, are vulnerable to habitat loss and further fragmentation. The areas which are deemed to be of high conservation significance have been demarcated as no-go areas and impacts on these areas should be minimised in order to ensure that impacts remain acceptable.

### 5. Cumulative Impacts.

The development will contribute to cumulative impacts in the area, which has already experienced a high degree of transformation. This is potentially significant if the development results in further transformation and fragmentation of intact habitat. However, if the development can be restricted to transformed and degraded areas, then the contribution to cumulative impact would be low and is not considered to be a significant concern associated with the development.

## **5.2 ASSESSMENT & SIGNIFICANCE CRITERIA**

Direct, indirect and cumulative impacts of the issues identified in this report are assessed in terms of the following criteria:

- The **nature** which includes a description of what causes the effect what will be affected and how it will be affected.
- The **extent** wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 is assigned as appropriate (with 1 being low and 5 being high):
- The **duration** wherein it is indicated whether:
  - the lifetime of the impact will be of a very short duration (0- 1 years) - assigned a score of 1.
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2.
  - medium-term (5-15 years) - assigned a score of 3
  - long term ( > 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5
- The **magnitude** quantified on a scale from 0-10 where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way 8 is high (processes are altered to the

extent that they temporarily cease) and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

- The **probability** of occurrence, which shall describe the (likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but of low likelihood) , 3 is probable (distinct possibility) , 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

The **significance** which shall be determined through a syntheses of the characteristics described above and can be assessed as low, medium or high;

and;

the status, which will be described as either positive, negative or neutral.

the degree to which the impact can be reversed.

the degree to which the impact may cause irreplaceable loss of resources.

the degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:

$$S = (E + D + M)P$$

Where

S = significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- **<30** points : **Low** (i.e. where this impact would not have a direct influence on the decision to develop in the area)
- **30-60** points : **Medium** (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated)
- **>60** points : **High** (i.e. where the impact must have an influence on the decision process to develop in the area).

## **6 Scoping Assessment of Impacts**

A preliminary assessment of the likely extent and significance of each impact identified above is made below. It is however important to note that this is a scoping assessment and represents the potential significance of impacts which may change substantially in the EIA depending on the mitigation and avoidance measures that are implemented by the proponent in response to the sensitivity maps and site attributes reported here.

**6.1 CONSTRUCTION & PLANNING PHASE IMPACTS**

**Impact 1: Impacts on vegetation due to construction activities**

<p><b>Impact Nature</b> Impacts on vegetation could occur due to disturbance and vegetation clearing associated with the construction of the facility. This impact would be greatly minimised if development within natural intact vegetation is avoided.</p> <p><b>Desktop Sensitivity Analysis of the Site</b> The majority of the site is already transformed and considered to be low sensitivity, but there are still some intact areas remaining which are considered higher sensitivity, with the larger better condition fragments considered to be high sensitivity.</p>			
<p><b>Issue</b> Disturbance and loss of intact vegetation due to construction activities</p>	<p><b>Nature of Impact</b> There are several listed vegetation types at the site and further loss and fragmentation of intact vegetation at the site is highly undesirable. In addition the intact fragments are likely to contain plant species of conservation concern.</p>	<p><b>Extent of Impact</b> Impact would be restricted to the development footprint and local in nature</p>	<p><b>No-Go Areas</b> A number of no-go areas associated with the intact fragments have been delineated.</p>
<p><b>Expected Significance of Impact</b> Where physical impact on the larger intact fragments (that have been identified as being High or Very High sensitivity) can be avoided, then this impact would be of <b>Low Significance</b>. Further habitat loss within the intact areas would, however, be considered to constitute a high impact and would compromise the viability of the development from an ecological perspective.</p>			
<p><b>Gaps in knowledge and recommendations for further study</b> The larger intact areas are clearly delineated and there is little uncertainty with regards to either their distribution or sensitivity. The only area of some uncertainty is the condition of some of the smaller intact fragments which are generally very degraded and retain little ecological value, but in some instances could retain some species of concern. There are no significant gaps in knowledge with regards to likely ecological impacts at the project site.</p>			

**Impact 2. Faunal impacts due to construction activities.**

<p><b>Impact Nature</b> There are no faunal species of high sensitivity that are likely to occur within the transformed</p>
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areas and the overall abundance of fauna within the project site is likely to be relatively low and represent those species more tolerant of transformation and habitat fragmentation. Disturbance, transformation and loss of intact habitat will have a negative effect on resident fauna during and after construction. Faunal disturbance will likely extend beyond the direct footprint and extend into adjacent intact areas, even though there may be no direct habitat loss in these areas. Although disturbance will be transient and restricted to the construction phase, any loss of intact habitat would be long-term.

**Desktop Sensitivity Analysis of the Site**

Most of the site is transformed and considered to be low sensitivity for fauna, but there are still some intact areas remaining which are considered higher sensitivity, with the larger better condition fragments considered to be high sensitivity.

<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Faunal disturbance and loss of intact faunal habitat due to construction activities	Fauna would be deterred from the area as a result of construction activities and in the long-term the site is already fragmented and the further loss or fragmentation of the intact areas will have negative impacts on fauna.	Impact would be restricted to the development footprint and local in nature	A number of no-go areas associated with the intact fragments have been delineated.

**Expected Significance of Impact**

When physical impact on the larger intact fragments (that have been identified as being High or Very High sensitivity) can be avoided, then this impact would be of **low significance**.

**Gaps in knowledge and recommendations for further study**

The larger intact areas are clearly delineated and there is little uncertainty with regards to either their distribution or sensitivity. There are no faunal species of high sensitivity that are likely to occur within the transformed areas and the overall abundance of fauna within the site is likely to be relatively low and represent those species more tolerant of transformation and habitat fragmentation. There are no significant gaps in knowledge with regards to likely faunal impacts at the site.

**Impact 3. Degradation of ecosystems**

**Impact Nature**

Disturbance created during construction would potentially result in ecosystem degradation as a result of erosion and alien plant invasion.

**Desktop Sensitivity Analysis of the Site**

Most of the site is transformed and considered to be low sensitivity with little risk of

degradation. Disturbance of the intact areas should however be avoided as much as possible.			
<b>Issue</b> Ecosystem degradation as a result of alien plant invasion and erosion.	<b>Nature of Impact</b> Alien invasion and erosion may occur following construction and lead to degradation of drainage systems or remaining intact areas.	<b>Extent of Impact</b> Impact would be restricted to the development footprint and adjacent areas and local in nature	<b>No-Go Areas</b> A number of no-go areas associated with the intact fragments have been delineated.
<b>Expected Significance of Impact</b> Provided that erosion control measures are implemented during construction then this impact would be of <b>Low Significance</b> .			
<b>Gaps in knowledge and recommendations for further study</b> As the site is largely transformed, there is little uncertainty with regards to the nature and extent of this impact.			

## 6.2 OPERATION PHASE IMPACTS

### Impact 1. Faunal Impacts due to operation

<b>Impact Nature</b> The operation and presence of the wind farm may lead to disturbance or persecution of fauna within or adjacent to the wind farm.			
<b>Desktop Sensitivity Analysis of the Site</b> Most of the site is transformed and considered to be low sensitivity for fauna, with little scope for long-term impact. However, the operation of the turbines will generate noise which may have some impact on sensitive species close to turbines.			
<b>Issue</b> Faunal disturbance due to operation of the wind farm.	<b>Nature of Impact</b> Disturbance of fauna due to maintenance activities or the operation of the wind turbines.	<b>Extent of Impact</b> Impact would be restricted to the site or nearby areas and local in nature	<b>No-Go Areas</b> A number of no-go areas associated with the intact fragments have been delineated.

**Expected Significance of Impact**

As the site is highly transformed, long-term impacts on fauna can be reduced to a **Low Significance** through avoiding impact on the larger intact fragments which are considered to be locally important for resident fauna.

**Gaps in knowledge and recommendations for further study**

The site is heavily transformed with the result that the areas considered to be important for fauna are clearly delineated. In addition, it is not likely that the site is important for any species of specific concern, with the result that uncertainties and issues with regards to long-term faunal impacts are low.

**Impact 2. Negative impact on CBAs and broad-scale ecological processes.**

**Impact Nature**

Development of the wind farm may impact CBAs and broad-scale ecological processes such as the ability of fauna to disperse and move about the landscape.

**Desktop Sensitivity Analysis of the Site**

Most of the site is transformed and considered to be low sensitivity for fauna and flora, with little scope for long-term impact on CBAs or ecological processes. The remaining intact areas are however considered sensitive and should be avoided to reduce this impact.

<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Habitat fragmentation and reduced ability of fauna and flora to disperse.	Further fragmentation and habitat loss within the intact areas will impact on the ability of fauna and flora to disperse and move about the landscape.	Impact would be restricted to the site or nearby areas and local in nature	A number of no-go areas associated with the intact fragments have been delineated.

**Expected Significance of Impact**

As the site is highly transformed, this impact would be largely restricted to the intact areas which are classified as CBAs and which can be avoided. Provided that the remaining intact areas are not significantly affected, then this impact is likely to remain of **Low Significance**.

**Gaps in knowledge and recommendations for further study**

The site is heavily transformed with the result that the areas considered to be important for fauna and flora are clearly delineated. Provided that these areas can be avoided, then there would be very little uncertainty with regards to impacts on CBAs and broad scale ecological processes.

**Impact 3. Cumulative impacts.**

<p><b>Impact Nature</b> Development of the wind farm may contribute to cumulative impacts on habitat loss and fragmentation in the area.</p>			
<p><b>Desktop Sensitivity Analysis of the Site</b> Most of the site is transformed and considered to have low scope for cumulative impacts. The remaining intact areas are however already fragmented and considered high vulnerable to further fragmentation and cumulative impact.</p>			
<p><b>Issue</b> Cumulative habitat loss and transformation due to development in the area.</p>	<p><b>Nature of Impact</b> Cumulative habitat loss and further fragmentation of the landscape due the cumulative impacts of development in the area.</p>	<p><b>Extent of Impact</b> Impact would be regional in nature</p>	<p><b>No-Go Areas</b> A number of no-go areas associated with the intact fragments have been delineated.</p>
<p><b>Expected Significance of Impact</b> The area is considered vulnerable to cumulative impact, and the development could potentially generate significant cumulative impact. However, if the intact areas are avoided, this this impact can be reduced to a <b>Low Significance</b>.</p>			
<p><b>Gaps in knowledge and recommendations for further study</b> The site is heavily transformed with the result that the potential for cumulative impact is high, but this impact would only occur if the intact areas are affected. As such, there is little uncertainty with regards to this impact and the assessment of the final impact will be based on the extent to which the remaining intact areas are affected.</p>			

**7 PROPOSED ACTIVITIES FOR THE EIA PHASE**

**Proposed Activities for the EIA Phase**

The current study is restricted to a desktop assessment and review of the prior EIA undertaken in the area. Fieldwork during the EIA phase will be an important activity required to validate and refine the findings of this report. This will include the following studies and activities:

- Ground-truth and refine the ecological sensitivity map of the site. Particular attention will be paid to the natural vegetation patches as well as the other areas of

potential concern which were identified in this report such as the areas associated with the wetlands and drainage lines.

- Identify and map the presence of any unique and special habitats at the site such as quartz patches and silcrete outcrops.
- Map the location of significant populations of species of conservation concern as well as evaluate the condition and status of the natural and near-natural vegetation at the site.
- Evaluate the likely presence of listed faunal species at the site such as the Cape Caco and identify associated habitats that should be avoided to prevent impact to such species.
- Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.
- Assess the impacts identified above in light of the site-specific findings and the final layout to be provided by the developer.

## **8 CONCLUSION & RECOMMENDATIONS**

Although the majority of the site is of low sensitivity and presents an opportunity for the development of the wind farm, there are also some very high sensitivity ecosystems present at the site which are considered to represent no-go areas from a development perspective. More than 100 listed species are known from the area and the intact fragments are also listed vegetation types and as a result, development within such areas would represent a potential red flag for the development. Provided that the sensitive areas are avoided, then the development would be likely to have a low terrestrial ecological impact. The alternative scenario in which several turbines are placed within the very high sensitivity areas should not be considered a viable option.

There are numerous small intact natural vegetation fragments at the site that appear to be degraded but which may still contain species of conservation concern. The presence of such species and sensitivity of the smaller fragments requires ground-truthing going into the EIA phase. Cumulative impacts as a result of the development are likely to be relatively low as the footprint of the development would be largely restricted to already transformed areas and operation impacts on terrestrial ecology within such areas would be very low.

With the application of relatively simple mitigation and avoidance measures, the impact of the Boulders Wind Farm can be reduced to a low overall level. There are no specific long-term impacts likely to be associated with the wind farm that cannot be reduced to an acceptable level through mitigation and avoidance. As such, there are no fatal flaws associated with the development and no apparent reasons that it should not proceed to the EIA phase.

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**10 ANNEX 1. LIST OF MAMMALS**

List of mammals which are likely to occur in the broad vicinity of the Boulders WEF study area. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2016.

<b>Family</b>	<b>Genus</b>	<b>Species</b>	<b>Common name</b>	<b>Red list category</b>
<i>Bathyergidae</i>	<i>Bathyergus</i>	<i>suillus</i>	Cape Dune Mole-rat	Least Concern
<i>Bathyergidae</i>	<i>Cryptomys</i>	<i>hottentotus</i>	Southern African Mole-rat	Least Concern
<i>Bathyergidae</i>	<i>Georchus</i>	<i>capensis</i>	Cape Mole-rat	Least Concern
<i>Bovidae</i>	<i>Raphicerus</i>	<i>campestris</i>	Steenbok	Least Concern
<i>Bovidae</i>	<i>Raphicerus</i>	<i>melanotis</i>	Cape Grysbok	Least Concern
<i>Bovidae</i>	<i>Sylvicapra</i>	<i>grimmia</i>	Bush Duiker	Least Concern
<i>Canidae</i>	<i>Canis</i>	<i>mesomelas</i>	Black-backed Jackal	Least Concern
<i>Canidae</i>	<i>Otocyon</i>	<i>megalotis</i>	Bat-eared Fox	Least Concern
<i>Canidae</i>	<i>Vulpes</i>	<i>chama</i>	Cape Fox	Least Concern
<i>Cercopithecidae</i>	<i>Papio</i>	<i>ursinus</i>	Chacma Baboon	Least Concern
<i>Chrysochloridae</i>	<i>Chrysochloris</i>	<i>asiatica</i>	Cape Golden Mole	Data Deficient
<i>Chrysochloridae</i>	<i>Eremitalpa</i>	<i>granti</i>	Grant's Golden Mole	Vulnerable
<i>Felidae</i>	<i>Caracal</i>	<i>caracal</i>	Caracal	Least Concern
<i>Herpestidae</i>	<i>Atilax</i>	<i>paludinosus</i>	Marsh Mongoose	Least Concern
<i>Herpestidae</i>	<i>Cynictis</i>	<i>penicillata</i>	Yellow Mongoose	Least Concern
<i>Herpestidae</i>	<i>Herpestes</i>	<i>ichneumon</i>	Egyptian Mongoose	Least Concern
<i>Herpestidae</i>	<i>Herpestes</i>	<i>pulverulentus</i>	Cape Gray Mongoose	Least Concern
<i>Hyaenidae</i>	<i>Hyaena</i>	<i>brunnea</i>	Brown Hyena	Near Threatened
<i>Hystricidae</i>	<i>Hystrix</i>	<i>africaeaustralis</i>	Cape Porcupine	Least Concern
<i>Leporidae</i>	<i>Lepus</i>	<i>capensis</i>	Cape Hare	Least Concern
<i>Macroscelididae</i>	<i>Elephantulus</i>	<i>edwardii</i>	Cape Elephant Shrew	Least Concern
<i>Molossidae</i>	<i>Tadarida</i>	<i>aegyptiaca</i>	Egyptian Free-tailed Bat	Least Concern
<i>Muridae</i>	<i>Aethomys</i>	<i>granti</i>	Grant's Rock Mouse	Least Concern
<i>Muridae</i>	<i>Aethomys</i>	<i>namaquensis</i>	Namaqua Rock Mouse	Least Concern
<i>Muridae</i>	<i>Desmodillus</i>	<i>auricularis</i>	Cape Short-tailed Gerbil	Least Concern
<i>Muridae</i>	<i>Gerbilliscus</i>	<i>afra</i>	Cape Gerbil	Least Concern
<i>Muridae</i>	<i>Gerbilliscus</i>	<i>paeba</i>	Paeba Hairy-footed Gerbil	Least Concern
<i>Muridae</i>	<i>Gerbilliscus</i>	<i>vallinus</i>	Brush-tailed Hairy-footed Gerbil	Least Concern
<i>Muridae</i>	<i>Mus</i>	<i>minutoides</i>	Southern African Pygmy Mouse	Least Concern
<i>Muridae</i>	<i>Myomyscus</i>	<i>verreauxi</i>	Verreaux's Mouse	Least Concern
<i>Muridae</i>	<i>Myotomys</i>	<i>unisulcatus</i>	Bush Karroo Rat	Not listed
<i>Muridae</i>	<i>Otomys</i>	<i>irroratus</i>	Southern African Vlei Rat	Least Concern
<i>Muridae</i>	<i>Otomys</i>	<i>saundersiae</i>	Saunders' Vlei Rat	Least Concern
<i>Muridae</i>	<i>Otomys</i>	<i>unisulcatus</i>	Karoo Bush Rat	Least Concern
<i>Muridae</i>	<i>Parotomys</i>	<i>brantsii</i>	Brants's Whistling Rat	Least Concern
<i>Muridae</i>	<i>Rhabdomys</i>	<i>pumilio</i>	Xeric Four-striped Grass Rat	Least Concern

<b>Family</b>	<b>Genus</b>	<b>Species</b>	<b>Common name</b>	<b>Red list category</b>
<i>Mustelidae</i>	<i>Aonyx</i>	<i>capensis</i>	African Clawless Otter	Least Concern
<i>Mustelidae</i>	<i>Ictonyx</i>	<i>striatus</i>	Striped Polecat	Least Concern
<i>Mustelidae</i>	<i>Mellivora</i>	<i>capensis</i>	Honey Badger	Near Threatened
<i>Nesomyidae</i>	<i>Dendromus</i>	<i>melanotis</i>	Gray African Climbing Mouse	Least Concern
<i>Nycteridae</i>	<i>Nycteris</i>	<i>thebaica</i>	Egyptian Slit-faced Bat	Least Concern
<i>Orycteropodidae</i>	<i>Orycteropus</i>	<i>afer</i>	Aardvark	Least Concern
<i>Procaviidae</i>	<i>Procavia</i>	<i>capensis</i>	Rock Hyrax	Least Concern
<i>Rhinolophidae</i>	<i>Rhinolophus</i>		Horseshoe Bats	Not listed
<i>Rhinolophidae</i>	<i>Rhinolophus</i>	<i>capensis</i>	Cape Horseshoe Bat	Near Threatened
<i>Rhinolophidae</i>	<i>Rhinolophus</i>	<i>clivosus</i>	Geoffroy's Horseshoe Bat	Near Threatened
<i>Soricidae</i>	<i>Crocidura</i>	<i>cyanea</i>	Reddish-gray Musk Shrew	Data Deficient
<i>Soricidae</i>	<i>Crocidura</i>	<i>flavescens</i>	Greater Red Musk Shrew	Data Deficient
<i>Soricidae</i>	<i>Myosorex</i>	<i>varius</i>	Forest Shrew	Data Deficient
<i>Soricidae</i>	<i>Suncus</i>	<i>varilla</i>	Lesser Dwarf Shrew	Data Deficient
<i>Vespertilionidae</i>	<i>Eptesicus</i>	<i>hottentotus</i>	Long-tailed Serotine	Least Concern
<i>Vespertilionidae</i>	<i>Miniopterus</i>	<i>natalensis</i>	Natal Long-fingered Bat	Not listed
<i>Vespertilionidae</i>	<i>Neoromicia</i>	<i>capensis</i>	Cape Serotine	Least Concern
<i>Viverridae</i>	<i>Genetta</i>	<i>genetta</i>	Common Genet	Least Concern
<i>Viverridae</i>	<i>Genetta</i>	<i>tigrina</i>	Cape Genet	Least Concern

**11 ANNEX 2. LIST OF REPTILES**

List of reptiles which are likely to occur in the broad vicinity of the Boulders WEF site, based on records from the SARCA database, conservation status is from Bates et al. 2013.

Family	Genus	Species	Subspecies	Common name	Red list category
Agamidae	<i>Agama</i>	<i>hispidia</i>		Spiny Ground Agama	Least Concern
Chamaeleonidae	<i>Bradypodion</i>	<i>occidentale</i>		Western Dwarf Chameleon	Least Concern
Chamaeleonidae	<i>Bradypodion</i>	<i>pumilum</i>		Cape Dwarf Chameleon	Vulnerable
Colubridae	<i>Crotaphopeltis</i>	<i>hotamboeia</i>		Red-lipped Snake	Least Concern
Colubridae	<i>Dasypeltis</i>	<i>scabra</i>		Rhombic Egg-eater	Least Concern
Colubridae	<i>Dispholidus</i>	<i>typus</i>	<i>typus</i>	Boomslang	Least Concern
Cordylidae	<i>Chamaesaura</i>	<i>anguina</i>	<i>anguina</i>	Cape Grass Lizard	Least Concern
Cordylidae	<i>Cordylus</i>	<i>cordylus</i>		Cape Girdled Lizard	Least Concern
Cordylidae	<i>Cordylus</i>	<i>macropholis</i>		Large-scaled Girdled Lizard	Near Threatened
Cordylidae	<i>Cordylus</i>	<i>niger</i>		Black Girdled Lizard	Near Threatened
Cordylidae	<i>Karusasaurus</i>	<i>polyzonus</i>		Karoo Girdled Lizard	Least Concern
Elapidae	<i>Naja</i>	<i>nivea</i>		Cape Cobra	Least Concern
Gekkonidae	<i>Afrogecko</i>	<i>porphyreus</i>		Marbled Leaf-toed Gecko	Least Concern
Gekkonidae	<i>Goggia</i>	<i>lineata</i>		Northern Striped Pygmy Gecko	Least Concern
Gekkonidae	<i>Pachydactylus</i>	<i>austeni</i>		Austen's Gecko	Least Concern
Gekkonidae	<i>Pachydactylus</i>	<i>geitje</i>		Ocellated Gecko	Least Concern
Lacertidae	<i>Meroles</i>	<i>knoxii</i>		Knox's Desert Lizard	Least Concern
Lacertidae	<i>Pedioplanis</i>	<i>lineocellata</i>	<i>pulchella</i>	Common Sand Lizard	Least Concern
Lamprophiidae	<i>Duberria</i>	<i>lutrix</i>	<i>lutrix</i>	South African Slug-eater	Least Concern
Lamprophiidae	<i>Homoroselaps</i>	<i>lacteus</i>		Spotted Harlequin Snake	Least Concern
Lamprophiidae	<i>Lamprophis</i>	<i>aurora</i>		Aurora House Snake	Least Concern
Lamprophiidae	<i>Psammophis</i>	<i>crucifer</i>		Cross-marked Grass Snake	Least Concern
Lamprophiidae	<i>Psammophis</i>	<i>leightoni</i>		Cape Sand Snake	Vulnerable
Lamprophiidae	<i>Psammophis</i>	<i>notostictus</i>		Karoo Sand Snake	Least Concern
Lamprophiidae	<i>Psammophylax</i>	<i>rhombeatus</i>	<i>rhombeatus</i>	Spotted Grass Snake	Least Concern
Lamprophiidae	<i>Pseudaspis</i>	<i>cana</i>		Mole Snake	Least Concern
Leptotyphlopidae	<i>Leptotyphlops</i>	<i>nigricans</i>		Black Thread Snake	Least Concern
Scincidae	<i>Acontias</i>	<i>grayi</i>		Gray's Dwarf Legless Skink	Least Concern
Scincidae	<i>Acontias</i>	<i>meleagris</i>		Cape Legless Skink	Least Concern
Scincidae	<i>Scelotes</i>	<i>bipes</i>		Silvery Dwarf Burrowing Skink	Least Concern
Scincidae	<i>Scelotes</i>	<i>gronovii</i>		Gronov's Dwarf Burrowing Skink	Near Threatened
Scincidae	<i>Scelotes</i>	<i>kasneri</i>		Kasner's Dwarf Burrowing Skink	Near Threatened
Scincidae	<i>Scelotes</i>	<i>montispectus</i>		Bloubergstrand Dwarf Burrowing Skink	Near Threatened
Scincidae	<i>Trachylepis</i>	<i>capensis</i>		Cape Skink	Least Concern

<b>Family</b>	<b>Genus</b>	<b>Species</b>	<b>Subspecies</b>	<b>Common name</b>	<b>Red list category</b>
<i>Scincidae</i>	<i>Trachylepis</i>	<i>homalocephala</i>		Red-sided Skink	Least Concern
<i>Scincidae</i>	<i>Trachylepis</i>	<i>variegata</i>		Variegated Skink	Least Concern
<i>Scincidae</i>	<i>Typhlosaurus</i>	<i>caecus</i>		Southern Blind Legless Skink	Least Concern
<i>Testudinidae</i>	<i>Chersina</i>	<i>angulata</i>		Angulate Tortoise	Least Concern
<i>Typhlopidae</i>	<i>Rhinotyphlops</i>	<i>lalandei</i>		Delalande's Beaked Blind Snake	Least Concern
<i>Viperidae</i>	<i>Bitis</i>	<i>arietans</i>	<i>arietans</i>	Puff Adder	Least Concern

**12 ANNEX 3. LIST OF AMPHIBIANS**

List of amphibians which are likely to occur in in the broad vicinity of the Boulders WEF site. Habitat notes and distribution records are based on Du Preez and Carruthers (2009), while conservation status is from the Minter et al. 2004.

<b>Scientific Name</b>	<b>Common Name</b>	<b>Status</b>	<b>Likelihood</b>
<i>Breviceps namaquensis</i>	Namaqua Rain Frog	Least Concern	High
<i>Breviceps rosei</i>	Sand Rain Frog	Least Concern	High
<i>Vandijkophrynus angusticeps</i>	Sand Toad	Least Concern	High
<i>Xenopus laevis</i>	Common Platanna	Least Concern	Low
<i>Amietia fuscigula</i>	Cape River Frog	Least Concern	Low
<i>Cacosternum capense</i>	Cape Caco	Vulnerable	Moderate
<i>Strongylopus grayii</i>	Clicking Stream Frog	Least Concern	Low
<i>Tomopterna delalandii</i>	Cape Sand Frog	Least Concern	Moderate