

SCOPING REPORT:

Specialist ecological study on the potential impacts of the proposed
Aberdeen 200MW Wind Farm Project, Eastern Cape

Prepared by

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SCOPING REPORT: 2nd Draft



David Hoare Consulting cc
Biodiversity Assessments, Vegetation Description /
Mapping, Species Surveys

REGULATIONS GOVERNING THIS REPORT

This report has been prepared in terms the EIA Regulations promulgated under the *National Environmental Management Act* No. 107 of 1998 (NEMA) and is compliant with Regulation 543 Section 32 - Specialist reports and reports on specialised processes under the Act. Relevant clauses of the above regulation are quoted below.

Regulation 32. (1): An applicant or the EAP managing an application may appoint a person who is independent to carry out a specialist study or specialised process.

Regulation 32. (2): The person referred to in subregulation (1) must comply with the requirements of regulation 17.

Regulation 32. (3): A specialist report or a report on a specialised process prepared in terms of these Regulations must contain:

- (a) details of (i) the person who prepared the report, and
(ii) the expertise of that person to carry out the specialist study or specialized process;
- (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;
- (d) a description of the methodology adopted in preparing the report or carrying out the specialized process;
- (e) a description of any assumptions made and any uncertainties or gaps in knowledge;
- (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;
- (g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority;
- (h) a description of any consultation process that was undertaken during the course of carrying out the study;
- (i) a summary and copies of any comments that were received during any consultation process;
- (j) any other information requested by the competent authority.

Section 17 relates to General requirements for EAPs or a person compiling a specialist report or undertaking a specialized process, as follows:

An EAP appointed in terms of regulation 16(1) must-

- (a) Be independent;
- (b) Have expertise in conducting environmental impact assessments, including knowledge of the Act, these regulations and any guidelines that have relevance to the proposed activity;
- (c) Perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- (d) Comply with the Act, the Regulations and all other applicable legislation;
- (e) Take into account, to the extent possible, the matters referred to in regulation 8 when preparing the application and any report relating to the application; and
- (f) Disclose to the applicant and the competent authority all material information in the possession of the EAP that reasonably has or may have the potential of influencing-
 - i. Any decision to be taken with respect to the application by the competent authority in terms of these Regulations; or
 - ii. The objectivity of any report, plan or document to be prepared by the EAP in terms of these Regulations for submission to the competent authority.

Appointment of specialist

David Hoare of David Hoare Consulting cc was commissioned by Savannah Environmental (Pty) Ltd to provide specialist consulting services for the Environmental Impact Assessment for the proposed Aberdeen Wind Farm Project in the Eastern Cape Province. The consulting services comprise an assessment of potential impacts on the flora, fauna, vegetation and ecology in the study area by the proposed project.

Details of specialist

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Summary of expertise

Dr David Hoare:

- Registered professional member of The South African Council for Natural Scientific Professions (Ecological Science, Botanical Science), registration number 400221/05.
- Founded David Hoare Consulting cc, an independent consultancy, in 2001.
- Ecological consultant since 1995.
- Conducted, or co-conducted, over 320 specialist ecological surveys as an ecological consultant.
- Published six technical scientific reports, 15 scientific conference presentations, seven book chapters and eight refereed scientific papers.
- Attended 15 national and international congresses & 5 expert workshops,
- Lectured vegetation science / ecology at 2 universities.
- Referee for 3 international journals.

Independence

David Hoare Consulting cc and its Directors have no connection with Eskom Holdings Limited. David Hoare Consulting cc is not a subsidiary, legally or financially, of the proponent. Remuneration for services by the proponent in relation to this project is not linked to approval by decision-making authorities responsible for authorising this proposed project and the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project. David Hoare is an independent consultant to Savannah Environmental (Pty) Ltd and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of this specialist performing such work.

Scope and purpose of report

The scope and purpose of the report are reflected in the "Terms of reference" section of this report.

Conditions relating to this report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. David Hoare Consulting cc and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

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INTRODUCTION

Terms of reference and approach

Savannah Environmental (Pty) Ltd. was appointed by Eskom Holdings Limited to undertake an application for environmental authorisation through an Environmental Impact Assessment (EIA) for the proposed "Aberdeen Wind Farm Project." The project involves the establishment of a wind energy facility and associated infrastructure, including up to 150 wind turbines, on-site substations, a power line linking to the existing Eskom transmission infrastructure, underground cables linking the turbines to the substation, borrow pits, workshop area and visitors centre, and internal access roads to each turbine. The purpose of the EIA is to identify environmental impacts associated with the project.

On 27 June 2011 David Hoare Consulting cc was appointed by Savannah Environmental (Pty) Ltd to undertake an ecological assessment of the study area. The specific terms of reference for the ecological scoping study include:

- to provide 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 project;
- to provide a description and evaluation of potential 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 issue/impacts;
- a comparative evaluation of any identified feasible alternatives (and if relevant the nomination of a preferred alternative for consideration in the EIA phase);
- identification of potentially significant impacts to be assessed within the EIA phase;
- to provide recommendations regarding the methodology to be adopted in assessing potentially significant impacts in the EIA phase (sufficiently detailed to be included within the Plan of Study for EIA and must include a description of the proposed method of assessing the potential environmental impacts associated with the project).

This report provides details of the results of the Scoping phase. The findings of the study are based on a desktop assessment of the study area, detailed assessment of aerial photographs of the site and expert knowledge of the area gained from general fieldwork conducted in the area on similar projects in the past.

Study area

At a regional level the study area falls within the Eastern Cape Province approximately 24 km west of Aberdeen. A more detailed description of the study area is provided in a section below.

METHODOLOGY

The environmental study is to be undertaken in two phases, a Scoping phase and an Environmental Impact Assessment phase. The objective of the Scoping phase study was to review fauna and flora patterns within the study area in order to identify any highly sensitive areas that should be avoided during development. It was therefore necessary to provide checklists of sensitive species that could potentially occur in the study area as well as habitats with high conservation value. For potential species, only those of high conservation concern are provided. It was also intended to provide a draft habitat map of the study area based on available maps and database information. The results of the Scoping phase study are provided in this report.

Assessment philosophy

Many parts of South Africa contain high levels of biodiversity at species and ecosystem level. At any single site there may be large numbers of species or high ecological complexity. Sites also vary in their natural character and uniqueness and the level to which they have been previously disturbed. Assessing the potential impacts of a proposed development often requires evaluating the conservation value of a site relative to other natural areas and relative to the national importance of the site in terms of biodiversity conservation. A simple approach to evaluating the relative importance of a site includes assessing the following:

- Is the site unique in terms of natural or biodiversity features?
- Is the protection of biodiversity features on the site of national/provincial importance?
- Would development of the site lead to contravention of any international, national or provincial legislation, policy, convention or regulation?

Thus, the general approach adopted for this type of study is to identify any critical biodiversity issues that may lead to the decision that the proposed project cannot take place, i.e. to specifically focus on red flags and/or potential fatal flaws. Biodiversity issues are assessed by documenting whether any important biodiversity features occur on site, including species, ecosystems or processes that maintain ecosystems and/or species. These can be organised in a hierarchical fashion, as follows:

Species

1. threatened plant species
2. protected trees
3. threatened animal species

Ecosystems

1. threatened ecosystems
2. protected ecosystems
3. critical biodiversity areas
4. areas of high biodiversity
5. centres of endemism

Processes

1. corridors
2. mega-conservancy networks
3. rivers and wetlands
4. important topographical features

It is not the intention to provide comprehensive lists of all species that occur on site, since most of the species on these lists are usually common or widespread species. Rare, threatened, protected and conservation-worthy species and habitats are considered to be the highest priority, the presence of which are most likely to result in significant negative impacts on the ecological environment. The focus on national and provincial priorities and critical biodiversity issues is in line with National legislation protecting environmental and biodiversity resources, including, but not limited to the following which ensure protection of ecological processes, natural systems and natural beauty as well as the preservation of biotic diversity in the natural environment:

1. Environment Conservation Act (Act 73 of 1989)
2. National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998)
3. National Environmental Management Biodiversity Act, 2004. (Act 10 Of 2004)

Plant and animal species of conservation concern

There are two types of species of concern for the site under investigation, (i) those listed by conservation authorities as being on a Red List and are therefore considered to be at risk of extinction, and (ii) those listed as protected according to National and/or Provincial legislation.

Red List plant species

Determining the conservation status of a species is required in order to identify those species that are at greatest risk of extinction and, therefore, in most need of conservation action. South Africa has adopted the IUCN Red List Categories and Criteria to provide an objective, rigorous, scientifically founded system to identify Red List species. A published list of the Red List species of South African plants (Raimondo et al. 2009) contains a list of all species that are considered to be at risk of extinction. This list is updated regularly to take new information into account, but these are not published in book/paper format. Updated assessments are provided on the SANBI website (<http://redlist.sanbi.org/>). According to the website of the Red List of Southern African Plants (<http://redlist.sanbi.org/>), *the conservation status of plants indicated on the Red List of South African Plants Online represents the status of the species within South Africa's borders. This means that when a species is not endemic to South Africa, only the portion of the species population occurring within South Africa has been assessed. The global conservation status, which is a result of the assessment of the entire global range of a species, can be found on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species: <http://www.iucnredlist.org>.* The South African assessment is used in this study.

The purpose of listing Red List plant species is to provide information on the potential occurrence of species at risk of extinction in the study area that may be affected by the proposed infrastructure. Species appearing on these lists can then be assessed in terms of their habitat requirements in order to determine whether any of them have a likelihood of occurring in habitats that may be affected by the proposed infrastructure.

Lists were compiled specifically for any species at risk of extinction (Red List species) previously recorded in the area. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute (<http://posa.sanbi.org>) for the quarter degree square/s within which the study area is situated. Habitat information for each species was obtained from various published sources. The probability of finding any of these species can then be assessed by comparing the habitat requirements with those habitats that occur on site.

Protected trees

Regulations published for the National Forests Act (Act 84 of 1998) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distribution of species on this list were obtained from published sources (e.g. van Wyk & van Wyk 1997) and from the SANBI Biodiversity Information System website (<http://sibis.sanbi.org/>) for quarter degree grids in which species have been previously recorded. Species that have been recorded anywhere in proximity to the site (within 100 km), or where it is considered possible that they could occur there, were listed in the Scoping Report and were considered as being at risk of occurring there.

Other protected species

National legislation was evaluated in order to provide lists of any plant or animal species that have protected status. The most important legislation is the following:

- *National Environmental Management: Biodiversity Act (Act No 10 of 2004)*

This legislation contains lists of species that are protected. These lists were scanned in order to identify any species that have a geographical range that includes the study area and habitat requirements that are met by those found on site. These species can then be searched for within suitable habitats on site.

Red List animal species

Lists of threatened animal species that have a geographical range that includes the study area were obtained from literature sources (for example, Alexander & Marais 2007, Branch 1988, 2001, du Preez & Carruthers 2009, Friedmann & Daly 2004, Mills & Hes 1997, Monadjem et al. 2010). The likelihood of any of them occurring was evaluated on the basis of habitat preference and habitats available at each of the proposed sites. The three parameters used to assess the probability of occurrence for each species were as follows:

- *Habitat requirements*: most Red Data animals have very specific habitat requirements and the presence of these habitat characteristics within the study area were assessed;
- *Habitat status*: in the event that available habitat is considered suitable for these species, the status or ecological condition was assessed. Often, a high level of degradation of a specific habitat type will negate the potential presence of Red Data species (especially wetland-related habitats where water-quality plays a major role); and
- *Habitat linkage*: movement between areas used for breeding and feeding purposes forms an essential part of ecological existence of many species. The connectivity of the study area to these surrounding habitats and adequacy of these linkages are assessed for the ecological functioning Red Data species within the study area.

Species probability of occurrence

Some species are highly mobile (e.g. many birds) or, in the case of plants, may be cryptic, difficult to find, rare, ephemeral or generally not easy to spot while undertaking a survey of a large area. An assessment of the possibility of these species occurring there was therefore provided. For all threatened or protected organisms (flora and fauna) that occur in the general geographical area of the site, a rating of the likelihood of it occurring on site is given as follows:

- **LOW**: no suitable habitats occur on site / habitats on site do not match habitat description for species;
- **MEDIUM**: habitats on site match general habitat description for species (e.g. karoo shrubland), but detailed microhabitat requirements (e.g. mountain shrubland on

shallow soils overlying sandstone) are absent on the site or are unknown from the descriptions given in the literature or from the authorities;

- **HIGH**: habitats found on site match very strongly the general and microhabitat description for the species (e.g. m mountain shrubland on shallow soils overlying sandstone);
- **DEFINITE**: species found in habitats on site.

Vegetation habitats of concern

The purpose of producing a habitat sensitivity map is to provide information on the location of potentially sensitive features in the study area. This was compiled by taking the following into consideration:

1. The general status of the vegetation of the study area was derived by compiling a landcover data layer for the study area (*sensu* Fairbanks et al. 2000) using available satellite imagery and aerial photography. From this it can be seen which areas are transformed versus those that are still in a natural status.
2. Various provincial, regional or national level conservation planning studies have been undertaken in the area, e.g. the National Spatial Biodiversity Assessment (NSBA), Succulent Karoo Ecosystem Rogramme (SKEP), Northern Cape Biodiversity Conservation Plan (NCBCP). The mapped results from these were taken into consideration in compiling the habitat sensitivity map.
3. Habitats in which various species of plants or animals occur that may be protected or are considered to have high conservation status are considered to be sensitive.

An explanation of the different sensitivity classes is given in Table 1. Areas containing untransformed natural vegetation of conservation concern, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered potentially sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to potentially have low sensitivity.

Table 1: Explanation of sensitivity ratings.

Sensitivity	Factors contributing to sensitivity	Example of qualifying features
VERY HIGH	<p>Indigenous natural areas that are highly positive for <u>any</u> of the following:</p> <ul style="list-style-type: none"> • presence of threatened species (Critically Endangered, Endangered, Vulnerable) and/or habitat critical for the survival of populations of threatened species. • <u>High</u> conservation status (low proportion remaining intact, highly fragmented, habitat for species that are at risk). • <u>Protected</u> habitats (areas protected according to national / provincial legislation, e.g. National Forests Act, Draft Ecosystem List of NEM:BA, Integrated Coastal Zone Management Act, Mountain Catchment Areas Act, Lake Areas Development Act) <p>And may also be positive for the following:</p> <ul style="list-style-type: none"> • <u>High</u> intrinsic biodiversity value (<u>high</u> species richness and/or turnover, unique 	<ul style="list-style-type: none"> • Critical Biodiversity Area 1 (CBA 1) areas. • Remaining areas of vegetation type listed in Draft Ecosystem List of NEM:BA as Critically Endangered, Endangered or Vulnerable. • Protected forest patches. • Confirmed presence of populations of threatened species.

Sensitivity	Factors contributing to sensitivity	Example of qualifying features
	<p>ecosystems)</p> <ul style="list-style-type: none"> • <u>High</u> value ecological goods & services (e.g. water supply, erosion control, soil formation, carbon storage, pollination, refugia, food production, raw materials, genetic resources, cultural value) • <u>Low</u> ability to respond to disturbance (low resilience, dominant species very old). 	
HIGH	<p>Indigenous natural areas that are positive for any of the following:</p> <ul style="list-style-type: none"> • <u>High</u> intrinsic biodiversity value (<u>moderate/high</u> species richness and/or turnover). • presence of habitat highly suitable for threatened species (Critically Endangered, Endangered, Vulnerable species). • <u>Moderate</u> ability to respond to disturbance (<u>moderate</u> resilience, dominant species of intermediate age). • <u>Moderate</u> conservation status (moderate proportion remaining intact, moderately fragmented, habitat for species that are at risk). • <u>Moderate to high</u> value ecological goods & services (e.g. water supply, erosion control, soil formation, carbon storage, pollination, refugia, food production, raw materials, genetic resources, cultural value). <p>And may also be positive for the following:</p> <ul style="list-style-type: none"> • <u>Protected</u> habitats (areas protected according to national / provincial legislation, e.g. National Forests Act, Draft Ecosystem List of NEM:BA, Integrated Coastal Zone Management Act, Mountain Catchment Areas Act, Lake Areas Development Act) 	<ul style="list-style-type: none"> • CBA 2 "critical biodiversity areas". • Habitat where a threatened species could potentially occur (habitat is suitable, but no confirmed records). • Confirmed habitat for species of lower threat status (near threatened, rare). • Habitat containing individuals of extreme age. • Habitat with low ability to recover from disturbance. • Habitat with exceptionally high diversity (richness or turnover). • Habitat with unique species composition and narrow distribution. • Ecosystem providing high value ecosystem goods and services.
MEDIUM-HIGH	<p>Indigenous natural areas that are positive for <u>one</u> or <u>two</u> of the factors listed above, but not a combination of factors.</p>	<ul style="list-style-type: none"> • CBA 2 "corridor areas". • Habitat with high diversity (richness or turnover). • Habitat where a species of lower threat status (e.g. (near threatened, rare) could potentially occur (habitat is suitable, but no confirmed records).
MEDIUM	<p>Other indigenous natural areas in which factors listed above are of no particular concern. May also</p>	

Sensitivity	Factors contributing to sensitivity	Example of qualifying features
	include natural buffers around ecologically sensitive areas and natural links or corridors in which natural habitat is still ecologically functional.	
MEDIUM-LOW	Degraded or disturbed indigenous natural vegetation.	
LOW	No natural habitat remaining.	

Any natural vegetation within which there are features of conservation concern will be classified into one of the high sensitivity classes (MEDIUM-HIGH, HIGH or VERY HIGH. The difference between these three high classes is based on a combination of factors and can be summarised as follows:

1. Areas classified into the VERY HIGH class are vital for the survival of species or ecosystems. They are either known sites for threatened species or are ecosystems that have been identified as being remaining areas of vegetation of critical conservation importance. CBA1 areas would qualify for inclusion into this class.
2. Areas classified into the HIGH class are of high biodiversity value, but do not necessarily contain features that would put them into the VERY HIGH class. For example, a site that is known to contain a population of a threatened species would be in the VERY HIGH class, but a site where a threatened species could potentially occur (habitat is suitable), but it is not known whether it does occur there or not, is classified into the HIGH sensitivity class. The class also includes any areas that are not specifically identified as having high conservation status, but have high local species richness, unique species composition, low resilience or provide very important ecosystem goods and services. CBA2 "irreplaceable biodiversity areas" would qualify for inclusion into this class, if there were no other factors that would put them into the highest class.
3. Areas classified into the MEDIUM-HIGH sensitivity class are natural vegetation in which there are one or two features that make them of biodiversity value, but not to the extent that they would be classified into one of the other two higher categories. CBA2 "corridor areas" would qualify for inclusion into this class.

Limitations

- Red List species are, by their nature, usually very rare and difficult to locate. Compiling the list of species that could potentially occur in an area is limited by the paucity of collection records that make it difficult to predict whether a species may occur in an area or not. The methodology used in this assessment is designed to reduce the risks of omitting any species, but it is always possible that a species that does not occur on a list may be unexpectedly located in an area.

DESCRIPTION OF STUDY AREA

Location

The study site is situated within the Camdeboo Local Municipality and is located approximately 24 km west of Aberdeen in the Eastern Cape Province (Figure 1) and falls within the quarter degree grids 3223BC, BD, DA and DB.

The farm portions on which the proposed wind energy facility would occur include the following:

- Portion 3 of Sambokdoorns 92
- RE of Portion 4 of Sambokdoorns 92
- RE of Sambokdoorns 92
- Portion 1 of Klipdrift 73
- Portion 2 of Farm 94, and
- RE of Portion 2 of Farm 94.

No alternative site is currently being considered for the proposed wind energy facility. The Aberdeen site was selected based on its wind climate and its proximity to the existing electricity grid, in addition to environmental factors.

The study area is located adjacent to the R61 road that links Aberdeen to Beaufort West (see Figure 1). The N9 National road passes through Aberdeen. Access to the site is directly from

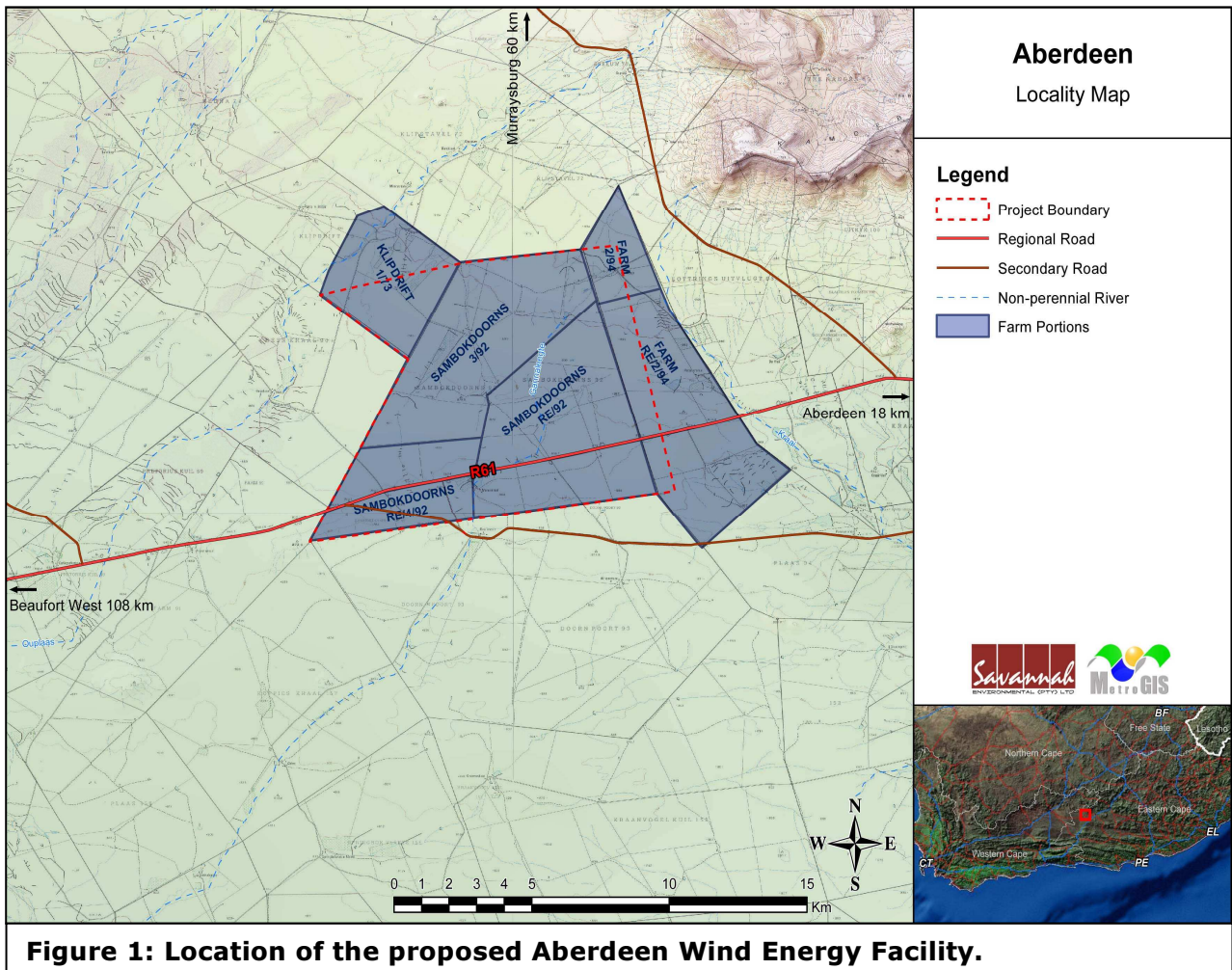


Figure 1: Location of the proposed Aberdeen Wind Energy Facility.

the R61. The site is therefore well-connected to a major route in this region.

Physiography and soils

The study site is located on the flat plains south of the Great Escarpment. The Kamdebooberg is just to the north-east of the site, but the site itself is relatively flat. The elevation varies from 856 to 936 m above sea level. There are some minor drainage lines on site that constitute very minor tributaries of the Kariega River.

Most of the site is underlain by mudstone and arenite of the Beaufort Group of the Karoo Supergroup. There is a band of dolerite running through the southern part of the site and the north-western part of the site is underlain by Quaternary age alluvial sediments consisting of calcrete and sand.

Detailed soil information is not available for broad areas of the country. As a surrogate, landtype data was used to provide a general description of soils in the study area (landtypes are areas with largely uniform soils, topography and climate). There are two landtypes in the study area, the Ia and Ag landtypes (Land Type Survey Staff, 1987).

The A-group of land types refer to yellow and red soils without water tables and belonging to one or more of the following soil forms: Inanda, Kranskop, Magwa, Hutton, Griffin, Clovelly (MacVicar et al. 1974). The map units refer to land that does not qualify as a plinthic catena and in which one or more of the above soil forms occupy at least 40% of the area (MacVicar et al. 1974). The Ag landtype refers to areas with red soils of high base status that are less than 300 mm deep (MacVicar et al. 1974). This is the most widespread unit on site.

The I-group of land types refer to soil patterns difficult to accommodate elsewhere, at least 60% of which comprises pedologically youthful, deep (more than 1 000 mm to underlying rock) unconsolidated deposits (MacVicar et al. 1974). Common soil forms are Dundee and Oakleaf. Ia refers to land types with at least 60% of which comprises pedologically youthful, deep (more than 1 000 mm to underlying rock) unconsolidated deposits. These are in a single band running from the northern boundary of the site to the western boundary of the site associated with one of the wide, shallow drainage areas.

Climate

The climate is arid to semi-arid. Rainfall is restricted primarily to the summer season, peaking in March. Mean temperatures are not extreme, with the mean annual temperature being approximately 17°C. Frost is a common phenomenon with up to 24 days of frost per year. Mean annual rainfall is just under 250 mm per year. All areas with less than 400 mm rainfall are considered to be arid. The study area can therefore be considered to be arid.

The effect of the arid climate is that there are no perennial streams in the area. Many streams terminate in shallow lakes that dry up soon after a rainfall event.

Landuse and landcover of the study area

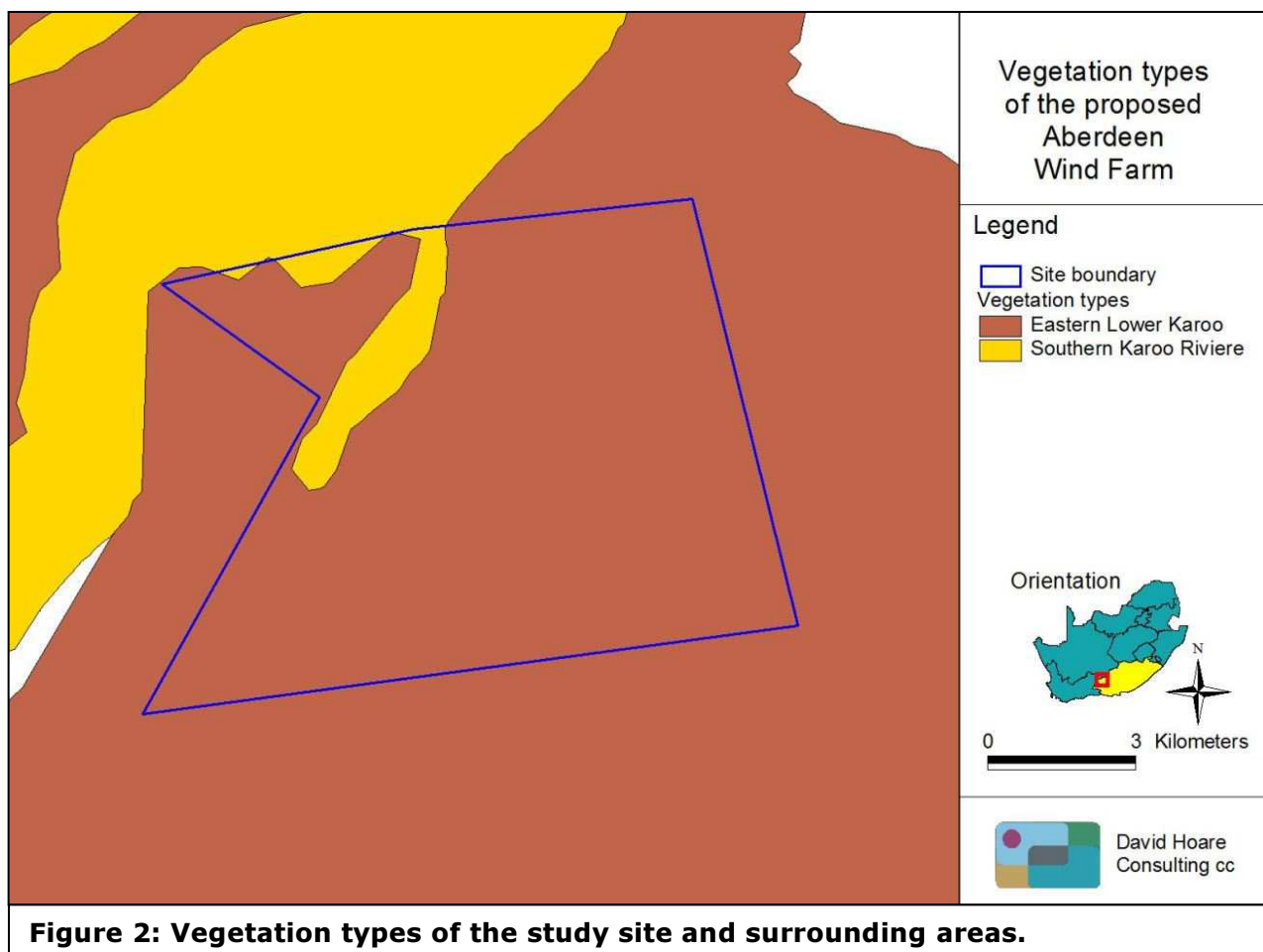
Landcover data for the area (Fairbanks et al. 2000) indicates that the entire site is in a natural condition. The natural parts of the landscape consist primarily of "shrubland and low fynbos" (Fairbanks et al. 2000).

The Surveyor-General's 1:50 000 topocadastral maps indicate three small areas of cultivation on site. These are difficult to recognise on aerial imagery, which indicates that they are only used temporarily or no longer used at all.

Broad vegetation types

Vegetation may be described at various hierarchical levels from Biome, to broad Vegetation Type and down to Plant Community level associated with local habitat conditions. There are three general descriptions of the vegetation in the study area. Acocks (1953) published the first comprehensive description of the vegetation of South Africa, which was updated in 1988. This was followed by an attempted improvement (Low & Rebelo 1998) which became widely used due to the inclusion of conservation evaluations for each vegetation type, but is often less rigorous than Acocks's original publication. More recently, a detailed map of the country was produced (Mucina *et al.*, 2005). A companion guide to this map (Mucina & Rutherford 2006), contains up-to-date species information and a comprehensive conservation assessment of all vegetation types. The classification of the vegetation according to the most recent publication is given below.

According to this most recent vegetation map of the country (Mucina *et al.*, 2005) the study area falls within two vegetation types, i.e. **Eastern Lower Karoo** and **Southern Karoo Riviere**, both of which fall within the Nama Karoo Biome, although the Southern Karoo Riviere is described as azonal.



Eastern Lower Karoo is found in the Eastern Cape and Western Cape on the plains east of the Kariega and Buffels Rivers in the area south of the Camdebo Mountains and the line of mountains linking to the Coetzeeberge encompassing Aberdeen, Graaff-Reinet and Pearston (Mucina et al. 2006a). This landscape consists of plains interrupted by some dolerite dykes, butts and mesas. The vegetation is a low to middle-height microphyllous shrubland with drought-resistant 'white' grasses becoming abundant in places, especially on sandy and silty bottomlands. Leaf-succulent dwarf shrubs of the families Aizoaceae and Crassulaceae may also be encountered. This vegetation type is found throughout most of the site (Figure 2).

Southern Karoo Riviere occurs in the Eastern Cape and Western Cape on the alluvia of the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega and Sundays Rivers and their tributaries, east of Laingsburg as far east as Graaff-Reinet and Jansenville (Mucina et al. 2006b). It is found on the narrow riverine flats. The vegetation is a complex of *Acacia karroo* or *Tamarix usneoides* thicket (up to 5 m tall), fringed by tall *Salsola*-dominated shrubland (up to 1.5 m tall), especially on heavier (and salt-laden) soils on very broad alluvia (Mucina et al. 2006b). In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. In the study area, this vegetation type is confined to a single narrow band that lies in the extreme north-western part of the site (Figure 2).

Conservation status of broad vegetation types

The vegetation types of South Africa have been categorised according to their conservation status which is, in turn, assessed according to degree of transformation and rates of conservation. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. On a national scale these thresholds are as depicted in Table 3, as determined by best available scientific approaches (Driver et al. 2005). The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36% (Driver et al. 2005).

The Draft National List of Threatened Ecosystems (GN1477 of 2009), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), lists national vegetation types that are afforded protected on the basis of rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the Draft Ecosystem List versus in the scientific literature.

Table 2: Determining ecosystem status (from Driver et al. 2005). *BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)	80-100	least threatened	LT
	60-80	vulnerable	VU
	*BT-60	endangered	EN
	0-*BT	critically endangered	CR

Table 3: Conservation status of different vegetation types occurring in the study area, according to Driver et al. 2005 and Mucina et al. 2005.

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation status	
				Driver et al. 2005; Mucina et al., 2006	Draft Ecosystem List (NEMBA)

Eastern Lower Karoo	16	0	2	Least Threatened	Not listed
Southern Karoo Riviere	24	3	12	Least Threatened	Not listed

Eastern Lower Karoo is classified in Mucina *et al.* (2006) as Least threatened, with none conserved of a target of 16% and 2% already transformed (Mucina *et al.* 2006). The Draft National List of Threatened Ecosystems (GN1477 of 2009), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), does not list this vegetation type.

Southern Karoo Riviere is classified in Mucina *et al.* (2006) as Least threatened, with 3% conserved of a target of 24% and 12% transformed (Mucina *et al.* 2006). The Draft National List of Threatened Ecosystems (GN1477 of 2009), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), does not list this vegetation type.

Red List plant species of the study area

Lists of plant species previously recorded in the quarter degree grids in which the study area is situated were obtained from the South African National Biodiversity Institute. These are listed in Appendix 1. Additional species that could occur in similar habitats, as determined from database searches and literature sources, but have not been recorded in these grids are also listed.

The initial search using the grids in which the site is located returned no species. A wider search for species included surrounding grids.

The species on this list were evaluated to determine the likelihood of any of them occurring on site. Of the species that are considered to occur within the geographical area under consideration, there were two species that could occur in habitats that are available in the study area. According to IUCN Ver. 3.1 (IUCN, 2001) both of these are listed as Declining (*Boophane disticha* and *Pelargonium sidoides*) (see Table 4 for explanation of categories). Both of these species are widespread and are listed as declining due to harvesting for medicinal use. However, both species regenerate populations quickly after harvesting. If they occur within the study area, it is highly unlikely that loss of a relatively small area of habitat within their overall geographical range will have any effect on the conservation status of the species or population processes within these species in this general area. The site is therefore considered to not contain any species of conservation concern that are likely to be negatively impacted upon by the development of a wind energy facility on site.

Table 4: Explanation of IUCN Ver. 3.1 categories (IUCN, 2001), and Orange List categories (Victor & Keith, 2004).

IUCN / Orange List category	Definition	Class
EX	Extinct	Extinct
CR	Critically Endangered	Red List
EN	Endangered	Red List
VU	Vulnerable	Red List
NT	Near Threatened	Orange List
Declining	Declining taxa	Orange List
Rare	Rare	Orange List
Critically Rare	Rare: only one subpopulation	Orange List
Rare-Sparse	Rare: widely distributed but rare	Orange List
DDD	Data Deficient: well known but not enough information for assessment	Data Deficient
DDT	Data Deficient: taxonomic problems	Data

IUCN / Orange List category	Definition	Class
		Deficient
DDX	Data Deficient: unknown species	Data Deficient
LC	Least Concern	Least Concern

Red List animal species of the study area

All Red List vertebrates (mammals, reptiles, amphibians) that could occur in the study area are listed in Appendix 2. Those vertebrate species with a geographical distribution that includes the study area and habitat preference that includes habitats available in the study area are discussed further. Birds and bats are being assessed in separate specialist studies.

There are no mammal species of conservation concern that have a distribution that coincides with the study area and that have a possibility of occurring on site.

There is one reptile species of conservation concern that has a distribution that includes the study area and which could occur on site, the Namaqua Plated Lizard (Near Threatened). This species is found in dry sandy areas, bare rocky hillsides and in *Acacia* scrub.

The Giant Bullfrog is the only amphibian species with a distribution that includes the study area and which could occur on site. This species is classified as Least Concern globally and Near Threatened in South Africa. It is, however, protected under the National Environmental Management: Biodiversity Act and any impacts on a specimen of this species or that may negatively affect the survival of the species would require a permit.

In summary, the animal species of conservation concern that could potentially occur on site are as follows (excluding birds and bats):

- Namaqua Plated Lizard (NT),
- Giant Bullfrog (NT),

Protected animals

There are a number of animal species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). According to this Act, "a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7". Such activities include any that are "of a nature that may negatively impact on the survival of a listed threatened or protected species". This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) that have a geographical distribution that includes the site and that may, therefore, occur on site are listed in Appendix 5, marked with the letter "N". This includes the following species that are considered to potentially occur on site:

- Black-footed Cat,
- Honey Badger,
- Leopard,
- Cape Fox,

Protected trees

Tree species protected under the National Forest Act are listed in Appendix 3. Those that have a geographical distribution that includes the study area are:

- *Podocarpus latifolius* (Real Yellowwood).

Podocarpus latifolius is found in coastal and Afromontane forest, which does not occur on site or nearby. It is therefore considered that there is no probability of protected trees occurring on site.

Wetlands, riparian zones and watercourses

In terms of legislation, wetlands, riparian zones and watercourses are defined in the National Water Act as a water resource and any activities that are contemplated that could affect the wetlands requires authorisation (Section 21 of the National Water Act of 1998). In addition they are also regarded as sensitive habitats in the National Environmental Management Act implying that they are afforded a higher level of protection. A "watercourse" in terms of the National Water Act (act 36 of 1998) means:

1. River or spring;
2. A natural channel in which water flows regularly or intermittently;
3. A wetland, lake or dam into which, or from which, water flows; and
4. Any collection of water which the Minister may, by notice in the gazette, declare to

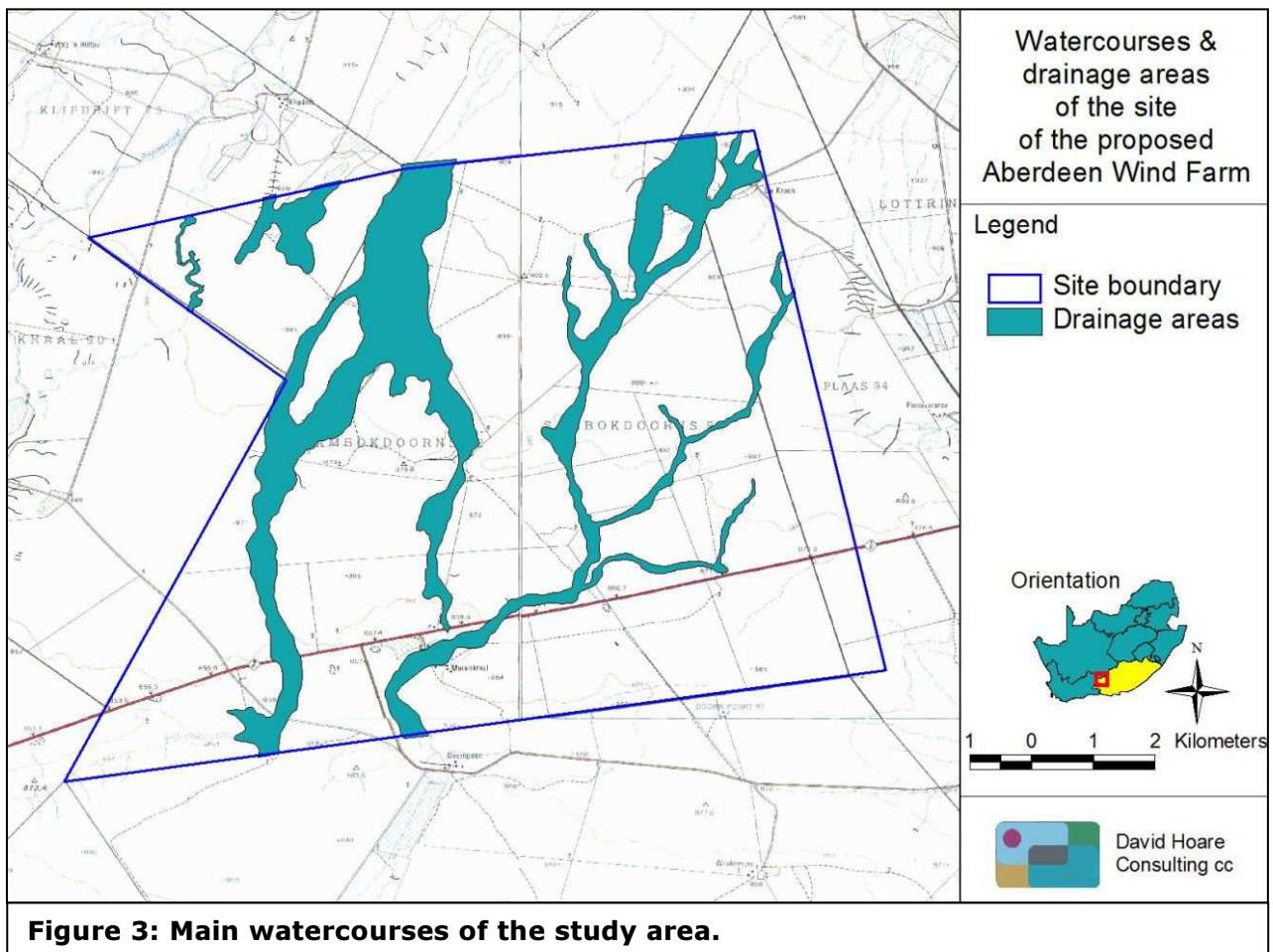


Figure 3: Main watercourses of the study area.

be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The site contains primarily dry drainage lines and watercourses (Figure 3). These constitute very minor tributaries of the Kariega River.

Regional conservation assessments

There have been a number of regional conservation assessments produced within the Eastern Cape Province, including the following:

- Subtropical Thicket Ecosystem Programme (STEP)
- Succulent Karoo Ecosystems Programme (SKEP)
- National Spatial Biodiversity Assessment (NSBA)
- Eastern Cape Biodiversity Conservation Plan (ECBCP).

These studies identify patterns and processes that are important for maintaining biodiversity in the region. Unfortunately, many of these studies have been done using coarse scale satellite imagery that does not provide spatial or spectral accuracy at the scale of the present study. They are, however, useful for understanding broad issues and patterns within the area. The ECBCP has integrated all previous studies and is a useful reference for identifying conservation issues in the study area and surrounds.

The ECBCP identifies Critical Biodiversity Areas (CBAs), which are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (Berliner & Desmet 2007). The ECBCP identifies CBAs at different levels with decreasing biodiversity importance, as follows (for the study area and surroundings):

1. PA: Protected areas.
2. CBA 1: CR vegetation types and irreplaceable biodiversity areas (areas definitely required to meet conservation targets).
3. CBA 2: EN vegetation types, ecological corridors, forest patches that do not fall into CBA 1, 1 km coastal buffer, irreplaceable biodiversity areas that do not fall into CBA 1.
4. CBA 3: VU vegetation types.

According to the ECBCP, the entire site falls within a CBA2 “corridor area” (Figure 4). The corridor areas are important for a number of reasons, including the maintenance of ecological processes. The corridor area that contains the site appears to link the Great Escarpment to the Cape Fold mountains to the south.

The National Protected Areas Expansion Strategy (NPAES) is another document that must be taken into account in evaluating biodiversity value of the site. The goal of the NPAES is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES uses two factors, importance and urgency, to identify priority areas for protected area expansion in the terrestrial environment. An area is considered important for the expansion of the landbased protected area network if it contributes to meeting biodiversity thresholds for terrestrial or freshwater ecosystems, maintaining ecological processes or climate change resilience. Urgency, the second factor used to identify priority areas for protected area expansion, is determined by the extent to which spatial options for meeting protected area targets still exist.

The Camdeboo Mountain to the north-east of the site has been identified as falling within areas that are considered priority areas for the NPAES. No parts of the site or its immediate surroundings are included in a proposed park expansion area.

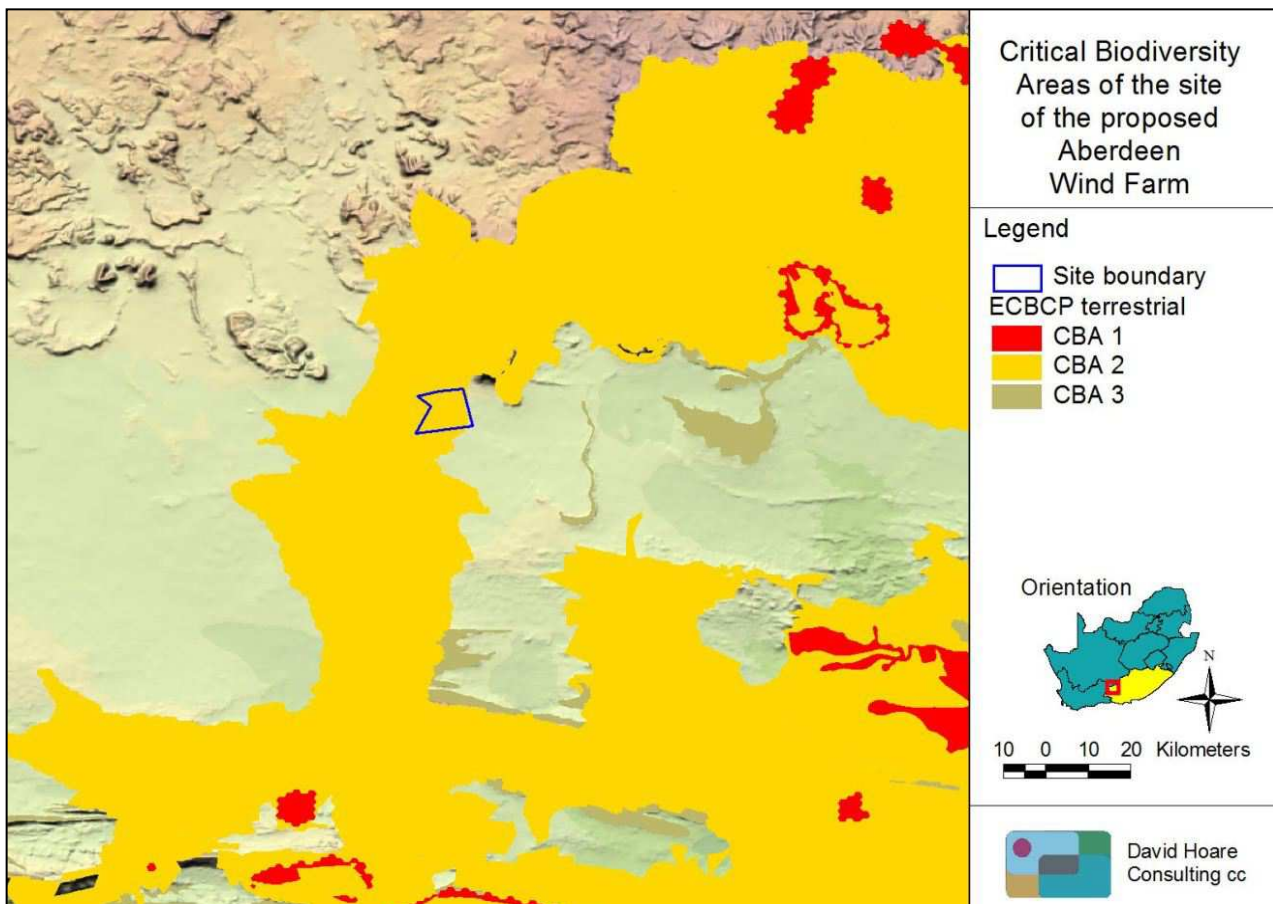


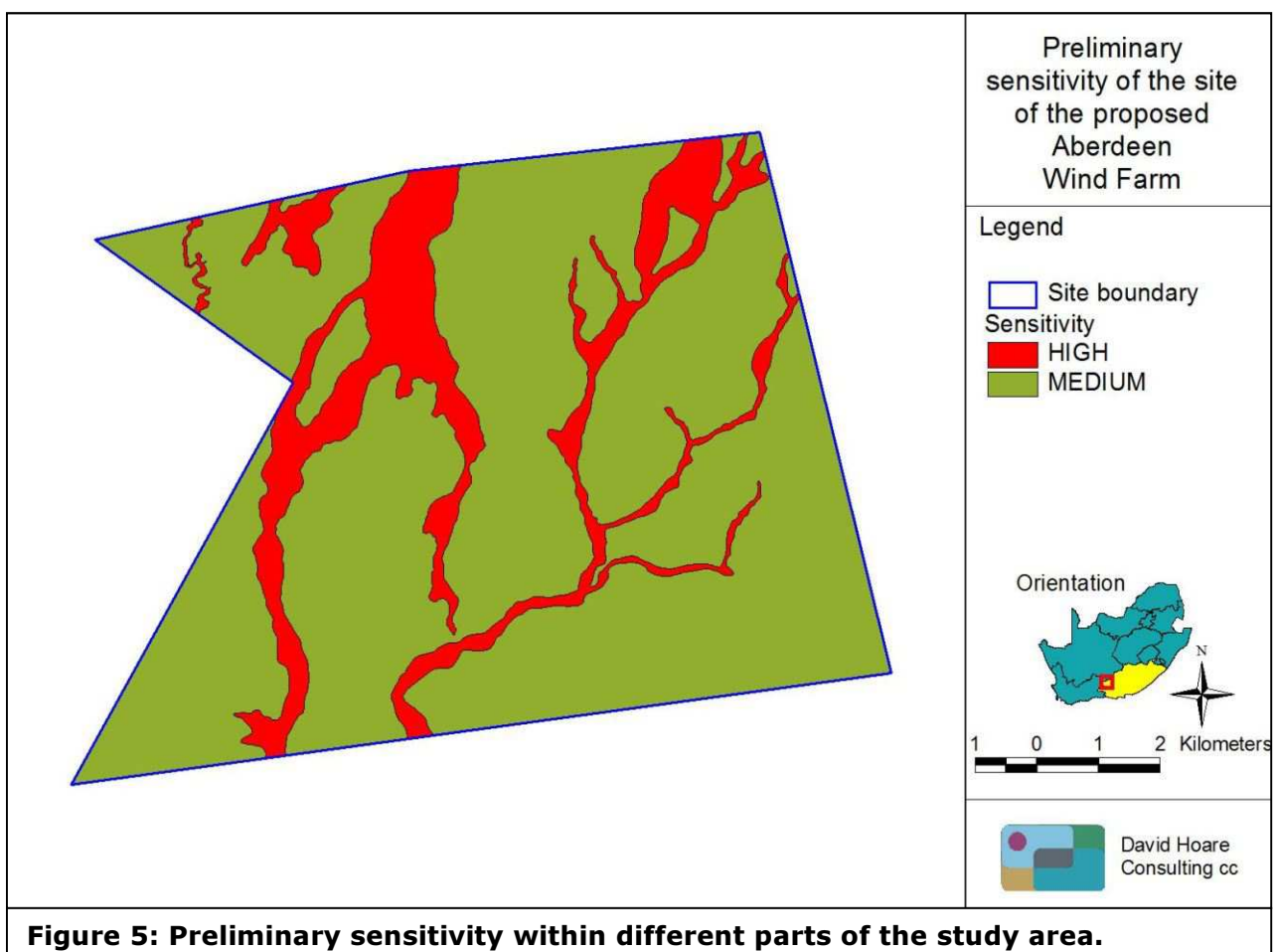
Figure 4: Important biodiversity areas of the study area (from ECBCP).

Preliminary sensitivity assessment

The preliminary sensitivity assessment identifies at a high (regional) level those parts of the study area that have high conservation value or that may be sensitive to disturbance. Areas containing untransformed natural vegetation, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to have low sensitivity. The information provided in the preceding sections was used to compile a preliminary map of remaining natural habitats and areas important for maintaining ecological processes in the study area. Broad scale mapping was used to provide information on the location of sensitive features. There are a number of features that need to be taken into account in order to evaluate sensitivity in the study area. These include the following:

1. potential occurrence of populations of Red List fauna and flora that have been evaluated as having a probability of occurring in natural habitats within the study area.
2. non-perennial rivers, streams and watercourses (Figure 3): this represents a number of ecological processes including groundwater dynamics, hydrological processes, nutrient cycling and wildlife dispersal. Maintenance of aquatic function in the Karoo Hoogland Municipal area is considered a high priority environmental management issue.

These factors have been taken into account in mapping potentially sensitive areas within the study area. These are mapped in Figure 5. This map shows the watercourses and drainage lines to have HIGH sensitivity and conservation value (Figure 5). Natural vegetation on site has MEDIUM sensitivity (Figure 5).



It is important to note that this ecological sensitivity assessment is based on a desktop study and that it identifies regional issues that apply to the site. The sensitivity assessment must be refined during fieldwork to be undertaken during the EIA phase of the project. The refinement will identify specific areas on site that are sensitive, taking the regional assessment into account.

RELEVANT LEGISLATIVE AND PERMIT REQUIREMENTS

Relevant legislation is provided in this section to provide a description of the key legal considerations of importance to the proposed project. The applicable legislation is listed below.

Legislation

National Environmental Management Act, Act No. 107 of 1998 (NEMA)

NEMA requires, inter alia, that:

- "development must be socially, environmentally, and economically sustainable",
- "disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied." ,
- "a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions",

NEMA states that "the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage."

Environment Conservation Act No 73 of 1989 Amendment Notice No R1183 of 1997

The ECA states that:

Development must be environmentally, socially and economically sustainable.

Sustainable development requires the consideration of inter alia the following factors:

- that pollution and degradation of the environment is avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and
- that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented are minimised and remedied.

The developer is required to undertake Environmental Impact Assessments (EIA) for all projects listed as a Schedule 1 activity in the EIA regulations in order to control activities which might have a detrimental effect on the environment. Such activities will only be permitted with written authorisation from a competent authority.

National Forests Act (Act no 84 of 1998)

Protected trees

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

Forests

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

National Environmental Management: Biodiversity Act (Act No 10 of 2004)

In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).

- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

Chapter 4 of the Act relates to threatened or protected ecosystems or species. According to Section 57 of the Act, "Restricted activities involving listed threatened or protected species":

- (1) A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7.

Such activities include any that are "of a nature that may negatively impact on the survival of a listed threatened or protected species".

Chapter 5 of the Act relates to species and organisms posing a potential threat to biodiversity. According to Section 75 of the Act, "Control and eradication of listed invasive species":

- (1) Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.
- (2) Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.
- (3) The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

Government Notice No. 1477 of 2009: Draft National List of Threatened Ecosystems

Published under Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). This Act provides for the listing of threatened or protected ecosystems based on national criteria. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the National Spatial Biodiversity Assessment (2004).

GNR 151: Critically Endangered, Endangered, Vulnerable and Protected Species List

Published under Section 56(1) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).

GNR 1187: Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List

Published under Section 56(1) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).

Conservation of Agricultural Resources (Act No. 43 of 1983) as amended in 2001

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

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

National Water Act No 36 of 1998

Wetlands, riparian zones and watercourses are defined in the Water Act as a water resource and any activities that are contemplated that could affect the wetlands requires authorisation (Section 21 of the National Water Act of 1998). A "watercourse" in terms of the National Water Act (act 36 of 1998) means:

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

Any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

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

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

Other Acts

Other Acts that may apply to biodiversity issues, but which are considered to not apply to the current site are as follows:

- National Environmental Management Protected Areas Act (Act No. 57 of 2003)
- Marine Living Resources Act (Act No. 18 of 1998)
- Sea Birds and Seals Protection Act (Act No. 46 of 1973)
- Lake Areas Development Act (Act No. 39 of 1975)
- Mountain Catchment Areas Act (Act No. 63 of 1970)
- Integrated Coastal Zone Management Act (Act No. 24 of 2008)

IDENTIFICATION OF RISKS AND POTENTIAL IMPACTS

Potential issues relevant to potential impacts on the ecology of the study area include the following:

- Impacts on biodiversity: this includes any impacts on populations of individual species of concern (flora and fauna), including protected species, and on overall species richness. This includes impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of concern.
- Impacts on sensitive habitats: this includes impacts on any sensitive or protected habitats, including, for example, indigenous forest, thicket and wetland vegetation, that leads to direct or indirect loss of such habitat.
- Impacts on ecosystem function: this includes impacts on any processes or factors that maintain ecosystem health and character, including the following:
 - disruption to nutrient-flow dynamics;
 - impedance of movement of material or water;
 - habitat fragmentation;
 - changes to abiotic environmental conditions;
 - changes to disturbance regimes, e.g. increased or decreased incidence of fire;
 - changes to successional processes;
 - effects on pollinators;
 - increased invasion by alien plants.

Changes to factors such as these may lead to a reduction in the resilience of plant communities and ecosystems or loss or change in ecosystem function.

- Secondary and cumulative impacts on ecology: this includes an assessment of the impacts of the proposed project taken in combination with the impacts of other known projects for the area or secondary impacts that may arise from changes in the social, economic or ecological environment.
- Impacts on the economic use of vegetation: this includes any impacts that affect the productivity or function of ecosystems in such a way as to reduce the economic value to users, e.g. reduction in grazing capacity, loss of harvestable products. It is a general consideration of the impact of a project on the supply of so-called ecosystem goods and services.

A number of direct risks to ecosystems would result from construction of the proposed WEF, as follows:

- Clearing of land for construction.
- Construction of access roads.
- Establishment of borrow and spoil areas.
- Chemical contamination of the soil by construction vehicles and machinery.
- Operation of construction camps.
- Storage of materials required for construction.

Description of potential impacts

Major potential impacts are described briefly below. These are compiled from a generic list of possible impacts derived from previous projects of this nature and from a literature review of the potential impacts of wind energy facilities on the ecological environment. There are two major ways that wind-energy development may influence ecosystem structure and functioning—through direct impacts on individual organisms and through impacts on habitat structure and functioning. The most important potential negative ecological impacts of a WEF

are related to bird and bat mortality and loss of habitat. Potential impacts are discussed in more detail below:

Impact 1: Impacts on threatened terrestrial animals

Nature: Threatened animal species are affected primarily by the overall loss of habitat, since direct construction impacts can often be avoided due to movement of individuals from the path of construction.

Threatened species include those classified as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localized populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include:

1. fragmentation of populations of affected species;
2. reduction in area of occupancy of affected species; and
3. loss of genetic variation within affected species.

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species' overall survival chances.

There is one reptile and one amphibian species of conservation concern that have a distribution that coincides with the study area and that have a possibility of occurring on site as a result of habitats available, i.e. the Namaqua Plated Lizard and the Giant Bullfrog. Both species are listed as Near Threatened (the Bullfrog is currently listed globally as Least Concern). The Namaqua Plated Lizard has a wide distribution in South Africa, from the Orange River to Cape Town and then eastwards to near Grahamstown, including areas from the coast to the Great Escarpment. The Giant Bullfrog also has a wide distribution in South Africa, occurring in most inland areas, extending northwards to include Zimbabwe, Botswana, parts of Namibia, parts of Mozambique and further northwards. Loss of some individuals on site is therefore unlikely to have an effect on overall population numbers.

Extent: The impact will occur at the site of the proposed WEF.

Magnitude: At a local scale, it is likely to be an impact of low magnitude (may cause a slight impact on population processes).

Duration: The impact will be of short-term duration (construction phase only, after which populations are likely to regenerate, if they have been affected, especially if suitable habitat is not adversely affected).

Probability: It is considered that there is a moderate probability of these Near Threatened species occurring on site, but a low probability that they will be directly affected by construction of infrastructure. The probability is therefore rated as "improbable" (some possibility, but low likelihood).

Potential significance: On the basis of this preliminary assessment, the impact is likely to be of very low significance.

Impact 2: Impacts on threatened plants

Plant species are especially vulnerable to infrastructure development due to the fact that they cannot move out of the path of the construction activities, but are also affected by overall loss of habitat.

Threatened species include those classified as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localized populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened plant species, loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences may include:

1. fragmentation of populations of affected species;
2. reduction in area of occupancy of affected species; and
3. loss of genetic variation within affected species.

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species' overall survival chances.

There are two plant species of low conservation concern that have a geographic distribution that includes the site and which have a chance of occurring in the study area. These species are listed as Declining (*Boophane disticha* and *Pelargonium sidoides*). The species are widespread and relatively common across their range. They are only listed because of heavy harvesting for medicinal use. Both species regenerate easily. They will not be adversely affected by loss of a very small area of habitat where they could occur.

Extent: The impact will occur at the site of the proposed WEF and is scored as local.

Magnitude: At a local scale, it is likely to be an impact of small magnitude (will not have an impact on population processes).

Duration: The impact will be of long-term duration (loss of habitat and/or individuals during the construction phase).

Probability: It is considered that there is a moderate probability of these Near Threatened species occurring on site, but a low probability that they will be directly affected by construction of infrastructure. The probability is therefore rated as "improbable" (some possibility, but low likelihood).

Potential significance: On the basis of this preliminary assessment, the impact is likely to be of very low significance.

Impact 3: Impacts on indigenous natural vegetation (terrestrial)

Construction of infrastructure may lead to direct loss of vegetation. This will lead to localised or more extensive reduction in the overall extent of fynbos vegetation. Where this vegetation has already been stressed due to degradation and transformation at a regional level, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Consequences of the impact occurring may include:

1. negative change in conservation status of habitat (Driver et al. 2005);
2. increased vulnerability of remaining portions to future disturbance;
3. general loss of habitat for sensitive species;
4. loss in variation within sensitive habitats due to loss of portions of it;
5. general reduction in biodiversity;

6. increased fragmentation (depending on location of impact);
7. disturbance to processes maintaining biodiversity and ecosystem goods and services; and
8. loss of ecosystem goods and services.

The remaining natural vegetation on site is classified as Least Threatened, but falls within a corridor area of the ECBCP.

Extent: The impact will occur at the site of the proposed WEF and is scored as local.

Magnitude: The potential magnitude of this impact will be small due to the small area of vegetation likely to be affected relative to the overall extent of the vegetation type concerned.

Duration: The impact will be permanent.

Probability: It is definite that the impact will occur. The site is in a natural state, which indicates that clearing of natural vegetation is required in order to build the wind energy facility.

Potential significance: On the basis of this preliminary assessment, the impact is likely to be of medium significance.

Impact 4: Impacts on wetlands and watercourses

Construction may lead to some direct or indirect loss of or damage to seasonal marsh wetlands or drainage lines or impacts that affect the catchment of these wetlands. This will lead to localised loss of wetland habitat and may lead to downstream impacts that affect a greater extent of wetlands or impact on wetland function. Where these habitats are already stressed due to degradation and transformation, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat. Physical alteration to wetlands can have an impact on the functioning of those wetlands. Consequences may include:

1. increased loss of soil;
2. loss of or disturbance to indigenous wetland vegetation;
3. loss of sensitive wetland habitats;
4. loss or disturbance to individuals of rare, endangered, endemic and/or protected species that occur in wetlands;
5. fragmentation of sensitive habitats;
6. impairment of wetland function;
7. change in channel morphology in downstream wetlands, potentially leading to further loss of wetland vegetation; and
8. reduction in water quality in wetlands downstream of road.

The site contains a number of watercourses and drainage lines, some of significant extent. These may be affected by access roads or inappropriately placed infrastructure.

Duration: The impact will be permanent due to the fact that clearing of land for construction purposes cannot be reversed.

Extent: The impact will occur at the site of the proposed facility, but could have downstream impacts. The extent of the potential impact is therefore on the site and surroundings.

Magnitude: The potential magnitude of this impact will be moderate (result in processes continuing but in a modified way), but depends on the proportion of the landscape potentially affected and the specific locality of affected sites.

Probability: Due to the fact that drainage lines occur on site, some fairly significant in size, it is highly probable that there will be drainage lines affected.

Potential significance: On the basis of this preliminary assessment, the impact is likely to be of medium significance. There is a legal obligation to apply for a Water Use Licence for any watercourses/wetlands that may be affected, since they are classified in the National Water Act as a water resource.

Impact 5: Establishment and spread of declared weeds and alien invader plants

Major factors contributing to invasion by alien invader plants includes high disturbance. Exotic species are often more prominent near infrastructural disturbances than further away (Gelbard & Belnap 2003, Watkins *et al.* 2003). Consequences of this may include:

1. loss of indigenous vegetation;
2. change in vegetation structure leading to change in various habitat characteristics;
3. change in plant species composition;
4. change in soil chemical properties;
5. loss of sensitive habitats;
6. loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
7. fragmentation of sensitive habitats;
8. change in flammability of vegetation, depending on alien species;
9. hydrological impacts due to increased transpiration and runoff; and
10. impairment of wetland function.

It is not known to what extent the site contains alien plants. Potential weeds with a distribution centred on arid regions of the country include *Salsola kali*, *Atriplex lindleyi*, *Opuntia ficus-indica*, *Opuntia imbricata*, *Prosopis glandulosa*, *Prosopis velutina*, *Atriplex numularia*, and *Nicotiana glauca*. It is not known which of these alien plants occur on site. The habitats most likely to be affected are watercourses. The invasion of watercourses by alien plants is a biodiversity issue of particular concern in all parts of South Africa.

Extent: The impact will occur at the site of the proposed WEF, but could potentially spread extensively into the surrounding landscape, depending on the habitat and the alien species that could potentially invade the site. The impact will therefore be evaluated at a scale of site and surroundings.

Magnitude: At a local scale, it is likely to be an impact of moderate magnitude (will result in processes continuing but in a modified way).

Duration: The impact will be of long-term duration.

Probability: There is a moderate likelihood that alien species will spread on site in the absence of control measures. The probability is therefore rated as "highly probable" (most likely).

Potential significance: On the basis of this preliminary assessment, the impact is likely to be of medium significance.

DISCUSSION AND CONCLUSIONS

There are two vegetation types that occur on site, namely Eastern Lower Karoo and Southern Karoo Riviere, both of which are classified as Least Threatened. The site falls within a corridor area of the Eastern Cape Biodiversity Conservation Plan and in a CBA2 area.

Local factors that may lead to parts of the study area having high ecological sensitivity are the potential presence of watercourses, wetlands and/or drainage lines on site and the potential presence of various plant and animal species of conservation concern. The actual presence of these features on site will have to be determined during detailed field surveys to be undertaken during the EIA phase of the project.

Watercourses and drainage lines (wetlands) represent particularly vital natural corridors as they function both as wildlife habitat, providing resources needed for survival, reproduction and movement, and as biological corridors, providing for movement between habitat patches. Both functions are potentially critical to conservation of biological diversity as the landscape becomes increasingly fragmented into smaller, more isolated patches (Rosenberg *et al.*, 1997). Watercourses, wetlands and drainage lines are protected according to the National Water Act.

There are no tree species that are protected under the National Forests Act that have a geographic distribution that includes this area and that are likely to occur on site (Appendix 3). There will, therefore, not be impacts on protected trees due to development of a wind energy facility on site.

Most of the site is still in natural condition or considered to be natural vegetation. The condition of the vegetation will be determined during field surveys to be undertaken during the EIA phase of the project. Any degraded areas on site are likely to be classified as having low sensitivity and conservation value, although few such areas could be discerned from aerial photography, and largely correlate with cultivated areas within the valley bottoms on the site.

There are two plant species of low conservation concern that have a geographic distribution that includes the site and which have a chance of occurring in the study area (*Boophane disticha* and *Pelargonium sidoides*). Both species are listed as Declining. The species are widespread and relatively common across their range. They are only listed because of heavy harvesting for medicinal use. Both species regenerate easily. They will not be adversely affected by loss of a very small area of habitat where they could occur. An assessment on potential impacts on these two species due to development of a wind energy facility on site indicates that impacts are likely to be of very low significance.

There are no threatened mammal species that have a distribution that coincides with the study area and that have a possibility of occurring on site.

There is one reptile and one amphibian species of conservation concern that have a distribution that coincides with the study area and that have a possibility of occurring on site as a result of habitats available, i.e. the Namaqua Plated Lizard and the Giant Bullfrog. Both species are listed as Near Threatened (the Bullfrog is currently listed globally as Least Concern). The Namaqua Plated Lizard has a wide distribution in South Africa, from the Orange River to Cape Town and then eastwards to near Grahamstown, including areas from the coast to the Great Escarpment. The Giant Bullfrog also has a wide distribution in South Africa, occurring in most inland areas, extending northwards to include Zimbabwe, Botswana, parts of Namibia, parts of Mozambique and further northwards. Loss of some individuals on site is therefore unlikely to have an effect on overall population numbers. An assessment on potential

impacts on these two species due to development of a wind energy facility on site indicates that impacts are likely to be of very low significance.

A risk assessment was undertaken which identified five potential impacts on the ecological receiving environment. The significance of these impacts will be assessed during the EIA phase after collection of relevant field data. The identified potential negative impacts are the following (with potential significance without mitigation measures given in brackets):

1. Impacts on threatened terrestrial animals (VERY LOW).
2. Impacts on threatened plants (VERY LOW).
3. Impacts on indigenous natural vegetation (MEDIUM).
4. Impacts on watercourses/wetlands (MEDIUM).
5. Establishment and spread of declared weeds and alien invader plants (MEDIUM).

Preliminary assessments were done on these potential impacts. These assessments were done under the assumption that features of concern definitely occur on site, which is not necessarily the case. For example, two terrestrial animals of low conservation concern could occur on site, but it is unknown whether they occur there or not. Construction of infrastructure may cause loss of habitat or individuals of these species – the assessment assumed that they would definitely be affected. The preliminary assessments are therefore a worst-case scenario. Due to the low significance of some potential impacts, it is recommended that they not be assessed further in the EIA phase of the project.

Summary of recommendations and proposed EIA methodology

The following assessments will be done during the EIA phase in order to properly assess potential impacts on the ecological receiving environment by the proposed WEF:

- The presence and distribution of watercourses and drainage lines on site must be confirmed in the field. This will be done primarily using aerial photograph interpretation, but will be confirmed in the field using topographic and floristic indicators.

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APPENDICES:

Appendix 1: Plant species of conservation importance that have historically been recorded in the study area.

*IUCN (3.1) Categories:

VU = Vulnerable

EN = Endangered

CR = Critically Endangered

NT = Near Threatened

Table A: Threatened, Near Threatened and Declining plant species that have been previously recorded in grids in which the study area is located (3223 BC, BD, DA, DB) or in grids adjoining these (3223AB, AD, BA, BB, CB, CD, DC, DD, 3224AA, AC, CA, CC).

Family	Taxon	Status	Habitat	Likelihood of occurrence on site
ASTERACEAE	Senecio muirii	Rare	Northern Cape, Western Cape, Calitzdorp to Gourits River. Fynbos, shale cliffs. A narrow habitat specialist known from six sites.	ZERO
AMARYLLIDACEAE	Gethyllis longistyla	Rare	Eastern Cape, Western Cape, Sneeuwberg, Agter Sneeuwberg and Nuweveld Mountains. Fynbos, tops of rocky, dolerite ridges. A rare and cryptic species known from two sites.	ZERO
ERICACEAE	Erica passerinoides	VU	Eastern Cape. Sneeuwberg in the Koudeveld Mountains, Katberg Pass and Cata Forest Reserve. Karoo-fynbos ecotone, on south-facing slopes.	ZERO
GERANIACEAE	Pelargonium sidoides	Declining	From the Eastern Cape, through Lesotho and the Free State as far north as Lichtenburg in North West Province and Lydenburg district in Mpumalanga. Albany Thicket, Fynbos, Grassland, Nama Karoo. Usually in short grassland, sometimes with occasional shrubs or trees, often in stony soils varying from clay-loam, shale or basalt.	MEDIUM
SCROPHULARIACEAE	Polycarena capensis	NT	Western Cape. Hopefield to the Cape Peninsula. Fynbos on sandy flats.	ZERO
AMARYLLIDACEAE	Boophone disticha	Declining	Throughout South Africa and up to Uganda. Albany Thicket, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama Karoo, Savanna, Succulent Karoo. Dry grassland and rocky areas.	MEDIUM

* Conservation Status Category assessment according to IUCN Ver. 3.1 (IUCN, 2001), as evaluated by the Threatened Species Programme of the South African National Biodiversity Institute in Pretoria

Appendix 2: Checklist of plant species recorded during previous botanical surveys in the quarter degrees in which the study area is located.

Family	Species
ASTERACEAE	<i>Arctotis diffusa</i> Thunb.
ASTERACEAE	<i>Arctotis leiocarpa</i>
ASPARAGACEAE	<i>Asparagus acocksii</i>
ASPARAGACEAE	<i>Asparagus concinnus</i>
ASPARAGACEAE	<i>Asparagus denudatus</i>
ASPARAGACEAE	<i>Asparagus microraphis</i>
ASPARAGACEAE	<i>Asparagus suaveolens</i>
POACEAE	<i>Avonia dinteri</i>
PHYSICIACEAE	<i>Buellia transvaalica</i>
CAPPARACEAE	<i>Cadaba aphylla</i>
CAPPARACEAE	<i>Capparis sepiaria</i> var. <i>citrifolia</i>
SCROPHULARIACEAE	<i>Chaenostoma halimifolium</i>
MESEMBRYANTHEMACEAE	<i>Chasmatophyllum musculinum</i>
ASTERACEAE	<i>Cuspidia cernua</i> subsp. <i>annua</i>
POACEAE	<i>Cynodon incompletus</i>
AMARYLLIDACEAE	<i>Cyrtanthus macowanii</i>
AMARYLLIDACEAE	<i>Cyrtanthus smithiae</i>
POACEAE	<i>Eragrostis curvula</i>
POACEAE	<i>Eragrostis lehmanniana</i> var. <i>lehmanniana</i>
POACEAE	<i>Eragrostis obtusa</i>
BRASSICACEAE	<i>Erucastrum strigosum</i>
ASTERACEAE	<i>Felicia filifolia</i> subsp. <i>schaeferi</i>
ASTERACEAE	<i>Felicia hirsuta</i>
ASTERACEAE	<i>Felicia ovata</i>
ASTERACEAE	<i>Gazania jurineifolia</i> subsp. <i>jurineifolia</i>
CELASTRACEAE	<i>Gymnosporia linearis</i> subsp. <i>linearis</i>
ASPHODELACEAE	<i>Haworthia nigra</i>
ASTERACEAE	<i>Helichrysum dregeanum</i>
MALVACEAE	<i>Hermannia cuneifolia</i> Jacq. var. <i>cuneifolia</i>
MALVACEAE	<i>Hermannia erodioides</i>
MALVACEAE	<i>Hermannia filifolia</i> var. <i>filifolia</i>
SCROPHULARIACEAE	<i>Jamesbrittenia foliolosa</i>
BORAGINACEAE	<i>Lappula capensis</i>
PLUMBAGINACEAE	<i>Limonium sinuatum</i> subsp. <i>sinuatum</i>
SCROPHULARIACEAE	<i>Manulea chrysantha</i>
MARSILEACEAE	<i>Marsilea burchellii</i>
IRIDACEAE	<i>Moraea polystachya</i>
PARMELIACEAE	<i>Namakwa exornata</i>
ASTERACEAE	<i>Oligocarpus calendulaceus</i>
GERANIACEAE	<i>Pelargonium odoratissimum</i>
POACEAE	* <i>Pennisetum setaceum</i>

ASTERACEAE	<i>Pteronia viscosa</i>
RESTIONACEAE	<i>Rhodocoma capensis</i>
BIGNONIACEAE	<i>Rhigozum obovatum</i>
SCROPHULARIACEAE	<i>Selago centralis</i>
CATILLARIACEAE	<i>Toninia bumamma</i>
ZYGOPHYLLACEAE	<i>Zygophyllum chrysopteron</i>

Appendix 3: List of protected tree species (National Forests Act).

<i>Acacia erioloba</i>	<i>Acacia haematoxylon</i>
<i>Adansonia digitata</i>	<i>Azelia quanzensis</i>
<i>Balanites</i> subsp. <i>maughamii</i>	<i>Barringtonia racemosa</i>
<i>Boscia albitrunca</i>	<i>Brachystegia spiciformis</i>
<i>Breonadia salicina</i>	<i>Bruguiera gymnorhiza</i>
<i>Cassipourea swaziensis</i>	<i>Catha edulis</i>
<i>Ceriops tagal</i>	<i>Cleistanthus schlechteri</i> var. <i>schlechteri</i>
<i>Colubrina nicholsonii</i>	<i>Combretum imberbe</i>
<i>Curtisia dentata</i>	<i>Elaeodendron transvaalensis</i>
<i>Erythrophysa transvaalensis</i>	<i>Euclea pseudebenus</i>
<i>Ficus trichopoda</i>	<i>Leucadendron argenteum</i>
<i>Lumnitzera racemosa</i> var. <i>racemosa</i>	<i>Lydenburgia abottii</i>
<i>Lydenburgia cassinoides</i>	<i>Mimusops caffra</i>
<i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i>	<i>Ocotea bullata</i>
<i>Ozoroa namaquensis</i>	<i>Philenoptera violacea</i> (<i>Lonchocarpus capassa</i>)
<i>Pittosporum viridiflorum</i>	<i>Podocarpus elongatus</i>
<i>Podocarpus falcatius</i>	<i>Podocarpus henkelii</i>
Podocarpus latifolius	<i>Protea comptonii</i>
<i>Protea curvata</i>	<i>Prunus africana</i>
<i>Pterocarpus angolensis</i>	<i>Rhizophora mucronata</i>
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	<i>Securidaca longependunculata</i>
<i>Sideroxylon inerme</i> subsp. <i>inerme</i>	<i>Tephrosia pondoensis</i>
<i>Warburgia salutaris</i>	<i>Widdringtonia cedarbergensis</i>
<i>Widdringtonia schwarzii</i>	

Podocarpus latifolius has a geographical distribution that coincides with the study area.

Appendix 4: Vertebrate species of conservation concern with a geographical distribution that includes the current study area.

(included are species previously listed, but currently considered to be Least Concern)

MAMMALS (excluding bats)

Common name	Taxon	Habitat	Status ¹	Likelihood of occurrence
Black rhinoceros	<i>Diceros bicornis bicornis</i>	Wide variety of habitats.	CR	NONE , only occurs in game reserves

¹Distribution according to Friedmann & Daly 2004.

²Status according to IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. (www.iucnredlist.org). Downloaded on 18 September 2011.

AMPHIBIANS

Common name	Species	Habitat	Status ²	Likelihood of occurrence
Giant Bullfrog	<i>Pyxicephalus adspersus</i>	Widely distributed in southern Africa, mainly at higher elevations. Inhabits a variety of vegetation types where it breeds in seasonal, shallow, grassy pans in flat, open areas; also utilises non-permanent vleis and shallow water on margins of waterholes and dams. Prefer sandy substrates although they sometimes inhabit clay soils.	NT ¹ LC ² Protected (NEMBA)	MEDIUM , within known distribution range, may be suitable habitat on site.

REPTILES

Common name	Species	Habitat	Status ⁴	Likelihood of occurrence
Namaqua plated lizard	<i>Gerrhosaurus typicus</i>	Dry sandy areas, bare rocky hillsides and <i>Acacia</i> scrub	NT	MEDIUM , suitable habitat may occur on site

³Distribution according to Alexander & Marais 2007, webpage of Animal Demography Unit, Zoology Dept., University of Cape Town (<http://ymus.adu.org.za>) and webpage of South African National Biodiversity Institute (<http://bgis.sanbi.org>).

⁴Status according to IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. (www.iucnredlist.org). Downloaded on 18 September 2011.

Appendix 5: Animal species with a geographical distribution that includes the study area.

Notes:

1. Species of conservation concern are in red lettering.
2. Species protected according to the Western Cape Nature Conservation Laws Amendment Act of 2000 (Act 3 of 2000) marked with "P"
3. Species protected according to the National Environmental Management: Biodiversity Act of 2004 (Act 10 of 2000) marked with "N"

Mammals:

Red hartebeest

Springbok

^NBlack rhinoceros – arid ecotype (CR)

Klipspringer

Gemsbok

Grey rhebok

Steenbok

Cape grysbok

Common duiker

Eland

Kudu

Rock hyrax

Water mongoose

Black-backed jackal

Caracal

Yellow mongoose

^NBlack-footed cat

African wild cat

Small grey mongoose

Small-spotted genet

^NBrown hyaena

Striped polecat

^NHoney badger

Bat-eared fox

^NLeopard

African weasel

Aardwolf

Suricate

^NCape fox

Lesueur's wing-gland bat (NT)

Cape serotine bat

Egyptian slit-faced bat

Geoffroy's horseshoe bat (NT)

Egyptian free-tailed bat

Reddish-grey musk shrew

Greater musk shrew

Lesser grey-brown musk shrew

Forest shrew

Cape/Desert hare

Scrub/Savannah hare

Hewitt's red rock rabbit

Namaqua rock mouse

Common mole-rat

Grey climbing mouse

Short-tailed gerbil

Hairy-footed gerbil

Spectacled dormouse

Porcupine

Large-eared mouse

Multimammate mouse

Pygmy mouse

Vlei rat

Saunders' vlei rat

Karoo bush rat

Brant's whistling rat

Springhare

Striped mouse

Pouched mouse

Cape rock elephant-shrew

Round-eared elephant shrew

Aardvark

Reptiles:

Eastern Cape dwarf chameleon

Namaqua chameleon

Puff adder

Horned adder

Cape cobra

Coral snake / coral shield cobra

Dwarf beaked snake

Karoo whip snake

Spotted skaapsteker

Brown house snake

Spotted rock snake

Mole snake

Sundevall's shovel-snout

Common egg-eater

Delalande's beaked blind snake

Common ground agama

Southern rock agama

Rock monitor

Delalande's sandveld lizard

Karoo sandveld lizard

Burchell's sand lizard

Karoo sand lizard

Namaqua sand lizard

Cape legless skink

Cape skink

Red-sided skink

Variiegated skink

Western rock skink

Western three-striped skink

Cape girdled lizard

Karoo girdled lizard
Cape crag lizard
Namaqua plated lizard (NT)
Giant ground gecko (peripheral)
Bibron's tubercled gecko
Cape gecko
Golden spotted gecko
Large-spotted gecko
Ocellated gecko
Marico gecko
Spotted barking gecko
Marsh terrapin
Greater padloper
Karoo padloper
Angulate tortoise
Leopard tortoise
Karoo tent tortoise

Amphibians

Southern pygmy toad
Karoo toad
Bubbling kassina
Common platanna
Boettger's caco
Cape river frog
^NGiant bullfrog
Clicking stream frog
Cape sand frog
Tandy's sand frog

Birds:

African Black Duck
African Fish Eagle
African Hoopoe
African Jacana
African Marsh Warbler
African Rail
African Sedge Warbler
African Spoonbill
Alpine Swift
Anteating Chat
Barn Owl
Barthroated Apalis
Black Crake
Black Crow
Black Eagle
Black Harrier (VU)
Black Korhaan
^N**Black Stork (NT)**
Black Sunbird
Black Swift
Blackbreasted Snake Eagle
Blackchested Prinia

Blackcrowned Night Heron
Blackeared Finchlark
Blackheaded Canary
Blackheaded Heron
Blacknecked Grebe
Blackshouldered Kite
Blacksmith Plover
Blackthroated Canary
Blackwinged Stilt
^N**Blue Crane (VU)**
Bokmakierie
Booted Eagle
Bradfield's Lark
Brownhooded Kingfisher
Brownthroated Martin
Burchell's Courser
Cape Bunting
Cape Canary
Cape Clapper Lark
Cape Eagle Owl
Cape Penduline Tit
Cape Reed Warbler
Cape Robin
Cape Rockthrush
Cape Shoveller
Cape Sparrow
Cape Teal
Cape Turtle Dove
Cape Wagtail
Cape Weaver
Cape White-eye
Capped Wheatear
Cardinal Woodpecker
Cattle Egret
Chat Flycatcher
Common Moorhen
Common Quail
Common Sandpiper
Common Waxbill
Crowned Plover
Curlew Sandpiper
Dabchick
Darter
Desert Cisticola
Diederik Cuckoo
Doublebanded Courser
Dusky Sunbird
Eastern Clapper Lark
Egyptian Goose
Ethiopian Snipe
Eurasian Bee-eater
Eurasian Golden Oriole
Eurasian Nightjar

Eurasian Roller
Eurasian Starling
Eurasian Swallow
Eurasian Swift
Fairy Flycatcher
Familiar Chat
Fantailed Cisticola
Feral Pigeon
Fierynecked Nightjar
Fiscal Flycatcher
Fiscal Shrike
Forktailed Drongo
Freckled Nightjar
Gabar Goshawk
Giant Kingfisher
Glossy Ibis
Goldenbreasted Bunting
Goliath Heron
Grassveld Pipit
Great Crested Grebe
Great Spotted Cuckoo
Greater Flamingo (NT)
Greater Honeyguide
Greater Kestrel
Greater Striped Swallow
Greenshank
Grey Heron
Greybacked Cisticola
Greybacked Finchlark
Greyheaded Gull
Greywing Francolin
Ground Woodpecker
Gymnogene
Hadedda Ibis
Hamerkop
Helmeted Guineafowl
Horus Swift
House Martin
House Sparrow
Jackal Buzzard
Jacobin Cuckoo
Karoo Chat
Karoo Eremomela
Karoo Korhaan
Karoo Lark
Karoo Longbilled Lark
Karoo Prinia
Karoo Robin
Karoo Thrush
Kittlitz's Plover
^NKori Bustard (VU)
Lanner Falcon (NT)
Larklike Bunting

Laughing Dove
Layard's Titbabbler
Lesser Doublecollared Sunbird
Lesser Flamingo (NT)
Lesser Grey Shrike
Lesser Honeyguide
^NLesser Kestrel (VU)
Levaillant's Cisticola
Little Bittern
Little Egret
Little Stint
Little Swift
Longbilled Crombec
Longbilled Pipit
^NLudwig's Bustard (VU)
Maccoa Duck
Malachite Kingfisher
Malachite Sunbird
Marsh Sandpiper
^NMartial Eagle (VU)
Masked Weaver
Mountain Chat
Namaqua Dove
Namaqua Sandgrouse
Namaqua Warbler
Neddicky
Osprey
Ostrich
Pale Chanting Goshawk
Palewinged Starling
Paradise Flycatcher
Pearlbreasted Swallow
^NPeregrine Falcon (NT)
Pied Avocet
Pied Barbet
Pied Crow
Pied Kingfisher
Pied Starling
Pintailed Whydah
Plainbacked Pipit
Pirit Batis
Purple Heron
Red Bishop
Redbacked Shrike
Redbilled Firefinch
Redbilled Quelea
Redbilled Teal
Redbreasted Sparrowhawk
Redcapped Lark
Redeyed Bulbul
Redeyed Dove
Redfaced Mousebird
Redheaded Finch

Redknobbed Coot
Redwinged Starling
Reed Cormorant
Ringed Plover
Rock Bunting
Rock Kestrel
Rock Martin
Rock Pigeon
Rock Pipit
Ruff
Rufouscheeked Nightjar
Rufouseared Warbler
Sacred Ibis
Sand Martin
Sanderling
Scalyfeathered Finch
Sclater's Lark (NT)
Secretarybird (NT)
Sicklewinged Chat
South African Cliff Swallow
South African Shelduck
Southern Boubou
Southern Grey Tit
Southern Greyheaded Sparrow
Southern Pochard
Southern Tchagra
Speckled Mousebird
Spikeheeled Lark
Spotted Dikkop
Spotted Eagle Owl
Spotted Flycatcher
Spurwinged Goose
Steppe Buzzard
Stonechat
Streakyheaded Canary
Thickbilled Lark
Threebanded Plover
Titbabbler
Tractrac Chat
Water Dikkop
Wattled Starling
Whimbrel
White Stork
Whitebacked Mousebird
Whitebreasted Cormorant
Whitenecked Raven
Whiterumped Swift
Whitethroated Canary
Whitethroated Swallow
Whitewinged Tern
Willow Warbler
Wood Sandpiper
Yellow Canary

Yellowbellied Eremomela
Yellowbilled Duck
Yellowbilled Kite
Yellowthroated Sparrow

**Appendix 6: Species protected under the National Environmental Management:
Biodiversity Act, 2004 (Act 10 of 2004)**
(as updated in R. 1187, 14 December 2007)

CRITICALLY ENDANGERED SPECIES

Reptilia

Loggerhead sea turtle
Leatherback sea turtle
Hawksbill sea turtle

Aves

Wattled crane
Blue swallow
Egyptian vulture
Cape parrot

Mammalia

Riverine rabbit
Rough-haired golden mole

Flora

Adenium swazicum
Aloe pillansii
Diaphanathe millarii
Dioscorea ebutsniorum
Encephalartos aemulans
Encephalartos brevifoliolatus
Encephalartos cerinus
Encephalartos dolomiticus
Encephalartos heenanii
Encephalartos hirsutus
Encephalartos inopinus
Encephalartos latifrons
Encephalartos middelburgensis
Encephalartos nubimontanus
Encephalartos woodii

ENDANGERED SPECIES

Reptilia

Green turtle
Giant girdled lizard
Olive ridley turtle
Geometric tortoise

Aves

Blue crane
Grey crowned crane
Saddle-billed stork
Bearded vulture
White-backed vulture
Cape vulture

Hooded vulture
Pink-backed pelican
Pel's fishing owl
Lappet-faced vulture

Mammalia

Robust golden mole
Tsessebe
Black rhinoceros
Mountain zebra
African wild dog
Gunning's golden mole
Oribi
Red squirrel
Four-toed elephant-shrew

Flora

Angraecum africae
Encephalartos arenarius
Encephalartos cupidus
Encephalartos horridus
Encephalartos laevifolius
Encephalartos lebomboensis
Encephalartos msinganus
Jubaeopsis caffra
Siphonochilus aethiopicus
Warburgia salutaris
Newtonia hilderbrandi

VULNERABLE SPECIES

Aves

White-headed vulture
Tawny eagle
Kori bustard
Black stork
Southern banded snake eagle
Blue korhaan
Taita falcon
Lesser kestrel
Peregrine falcon
Bald ibis
Ludwig's bustard
Martial eagle
Bataleur
Grass owl

Mammalia

Cheetah
Samango monkey
Giant golden mole
Giant rat
Bontebok

Tree hyrax
Roan antelope
Pangolin
Juliana's golden mole
Suni
Large-eared free-tailed bat
Lion
Leopard
Blue duiker

Flora

Aloe albida
Encephalartos cycadifolius
Encephalartos Eugene-maraisii
Encephalartos ngovanus
Merwillia plumbea
Zantedeschia jucunda

PROTECTED SPECIES

Amphibia

Giant bullfrog
African bullfrog

Reptilia

Gaboon adder
Namaqua dwarf adder
Smith's dwarf chameleon
Armadillo girdled lizard
Nile crocodile
African rock python

Aves

Southern ground hornbill
African marsh harrier
Denham's bustard
Jackass penguin

Mammalia

Cape clawless otter
South African hedgehog
White rhinoceros
Black wildebeest
Spotted hyaena
Black-footed cat
Brown hyaena
Serval
African elephant
Spotted-necked otter
Honey badger
Sharpe's grysbok
Reedbuck
Cape fox

Flora

Adenia wilmsii
Aloe simii
Clivia mirabilis
Disa macrostachya
Disa nubigena
Disa physodes
Disa procera
Disa sabulosa
Encephelartos altensteinii
Encephelartos caffer
Encephelartos dyerianus
Encephelartos frederici-guilielmi
Encephelartos ghellinckii
Encephelartos humilis
Encephelartos lanatus
Encephelartos lehmannii
Encephelartos longifolius
Encephelartos natalensis
Encephelartos paucidentatus
Encephelartos princeps
Encephelartos senticosus
Encephelartos transvenosus
Encephelartos trispinosus
Encephelartos umbeluziensis
Encephelartos villosus
Euphorbia clivicola
Euphorbia meloformis
Euphorbia obesa
Harpagophytum procumbens
Harpagophytum zeyherii
Hoodia gordonii
Hoodia currorii
Protea odorata
Stangeria eriopus