

## **ENVIRONMENTAL IMPACT REPORT:**

# Specialist fauna study on potential impacts of the proposed Exxaro West Coast Wind Energy Facility Project near Brand se Baai, Western Cape

Prepared by

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on behalf of  
Exxaro Resources

22 November 2010

**EIA REPORT:** 2nd draft



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

## CONTROL SHEET FOR SPECIALIST REPORT

The table below lists the specific requirements for specialist studies, according to Regulation 33 of Government Notice No. R385 of 1996 EIA Regulations.

Activity	Yes	No	Comment
Details of:			
i. the person who prepared the report; and	√		
ii. the expertise of that person to carry out the specialist study or specialised process	√		
A declaration that the person is independent in a form as may be specified by the competent authority	√		
An indication of the scope of, and the purpose for which, the report was prepared	√		
A description of the methodology adopted in preparing the report or carrying out the specialised process	√		
A description of any assumptions made and any uncertainties or gaps in knowledge	√		
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	√		
Recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	√		
A description of any consultation process that was undertaken during the course of carrying out the study	√		
A summary and copies of any comments that were received during any consultation process	√		
Any other information requested by the competent authority	√		

## **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 385 Section 33 - Specialist reports and reports on specialized processes under the Act. Relevant clauses of the above regulation are quoted below and reflect the required information in the "Control sheet for specialist report" given above.

Regulation 33. (1): An applicant or the EAP managing an application may appoint a person who is independent to carry out a specialist study or specialized process.

Regulation 33. (2): A specialist report or a report on a specialized 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) declaration that the person is independent in a form as may be specified by the competent authority;
- (c) indication of the scope of, and the purpose for which, the report was prepared;
- (d) description of the methodology adopted in preparing the report or carrying out the specialized process;
- (e) description of any assumptions made and any uncertainties or gaps in knowledge;
- (f) 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) description of any consultation process that was undertaken during the course of carrying out the study;
- (i) summary and copies of any comments that were received during any consultation process;
- (j) any other information requested by 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 Exxaro West Coast Wind Energy Facility Project adjacent to Namakwa Sands near Bitterfontein in the Western Province. The consulting services comprise an assessment of potential impacts on the fauna in the study area by the proposed project.

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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 200 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 and referee for 2 international journals.

## ***Independence***

David Hoare Consulting cc and its Directors have no connection with Exxaro. 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. The percentage work received directly or indirectly from the proponent in the last twelve months is approximately 0% of turnover.

## ***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 Exxaro Resources to undertake an application for environmental authorisation through an Environmental Impact Assessment (EIA) for the proposed "West Coast Wind Energy Facility Project." The project involves the establishment of a wind energy facility and associated infrastructure, including wind turbines, underground cables between turbines, a substation, a 132kV power line, and internal access roads on a site to the north of the Namakwa Sands Mine north of Vredendal on the West Coast. The purpose of the EIA is to identify environmental impacts associated with the project.

In June 2010 David Hoare Consulting cc was appointed by Savannah Environmental (Pty) Ltd to undertake a fauna assessment of the study area. The specific terms of reference for the ecological study include:

- an indication of the methodology used in determining the significance of potential environmental impacts;
- a description of the environmental issues that were identified during the environmental impact assessment process;
- an assessment of the significance of direct, indirect and cumulative impacts in terms of standard criteria;
- a description and comparative assessment of all alternatives identified during the environmental impact assessment process;
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Plan;
- an indication of the extent to which the issue could be addressed by the adoption of achievable mitigation measures;
- a description of any assumptions, uncertainties and gaps in knowledge;
- an environmental impact statement which contains
- a summary of the key findings of the environmental impact assessment,
- an assessment of the positive and negative implications of the proposed activity,
- a comparative assessment of the positive and negative implications of the distribution line alternatives,
- a comparative assessment of the positive and negative implications of the access road alternatives.

This report provides details of the results of the EIA phase. The findings of the study are based on a combination of a desktop assessment of the study area and fieldwork undertaken on site.

### **Study area**

At a regional level the study area falls within the Western Cape Province to the west of the town of Bitterfontein. A more detailed description of the study area is provided in a section below.

## **METHODOLOGY**

The project was to be undertaken in two phases, a Scoping phase and an Environmental Impact Assessment phase. The objective of the EIA phase study was to assess the significance of potential impacts on fauna within the study area. This report contains all the descriptive information on flora and fauna that were presented in the Scoping report as well as a comprehensive assessment of potential impacts. The results of the EIA 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 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, as follows:

#### Species

1. threatened animal species

#### Ecosystems

1. critical biodiversity areas
2. areas of high biodiversity
3. centres of endemism

#### Processes

1. corridors
2. mega-conservancy networks

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)

#### **Animal species of concern**

The purpose of listing Red Data animal species was to provide information on the potential occurrence of species of special concern in the study area that may be affected by the proposed infrastructure. Species appearing on these lists could 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 of conservation concern previously recorded in the area and any other species with potential conservation value. Lists of threatened animal and bird species that have a geographical range that includes the study area were obtained from literature sources (e.g. Branch 1988, 2001, Friedmann & Daly 2004, Mills & Hes 1997). 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.

For all threatened 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. fynbos), but detailed microhabitat requirements (e.g. mountain fynbos on shallow soils overlying Table Mountain 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. mountain fynbos on shallow soils overlying Table Mountain sandstone);
- DEFINITE: species found in habitats on site.

#### **Sensitivity assessment**

The study site was evaluated in terms of the potential for containing habitat for animal species of conservation concern. Any habitat considered important for species of concern was considered to be sensitive whereas habitat not important for species of conservation concern was considered to be not sensitive (Table 1).

**Table 1: Sensitivity analysis**

Sensitivity class	Description
Low Sensitivity	Habitat with no breeding, inhabiting or foraging importance for animal species of conservation concern
Medium Sensitivity	Habitat with breeding, inhabiting or foraging importance for animal species of low conservation concern (Near Threatened, Declining, Rare or Restricted)
High Sensitivity	Habitat with breeding, inhabiting or foraging importance for animal species of high conservation concern (Critically Endangered, Endangered or Vulnerable)

### Assessment of impacts

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase were assessed in terms of the following criteria:

- » The **nature**, which includes a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 was assigned as appropriate (with 1 being low and 5 being high):
- » The **duration**, wherein it was indicated whether:
  - \* the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - \* the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - \* medium-term (5–15 years) – assigned a score of 3;
  - \* long term (> 15 years) - assigned a score of 4; or
  - \* permanent - assigned a score of 5;
- » The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability was estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- » the **significance**, was determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » the **status**, which was described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the degree to which the impact can be mitigated.

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

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

S = Significance weighting  
E = Extent  
D = Duration  
M = Magnitude  
P = Probability

The **significance weightings** for each potential impact are as follows:

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

### **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 sometimes limited by a paucity of collection records. This may make it difficult to predict whether a species could 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 located in an area where it was not previously known to exist.

## DESCRIPTION OF STUDY AREA

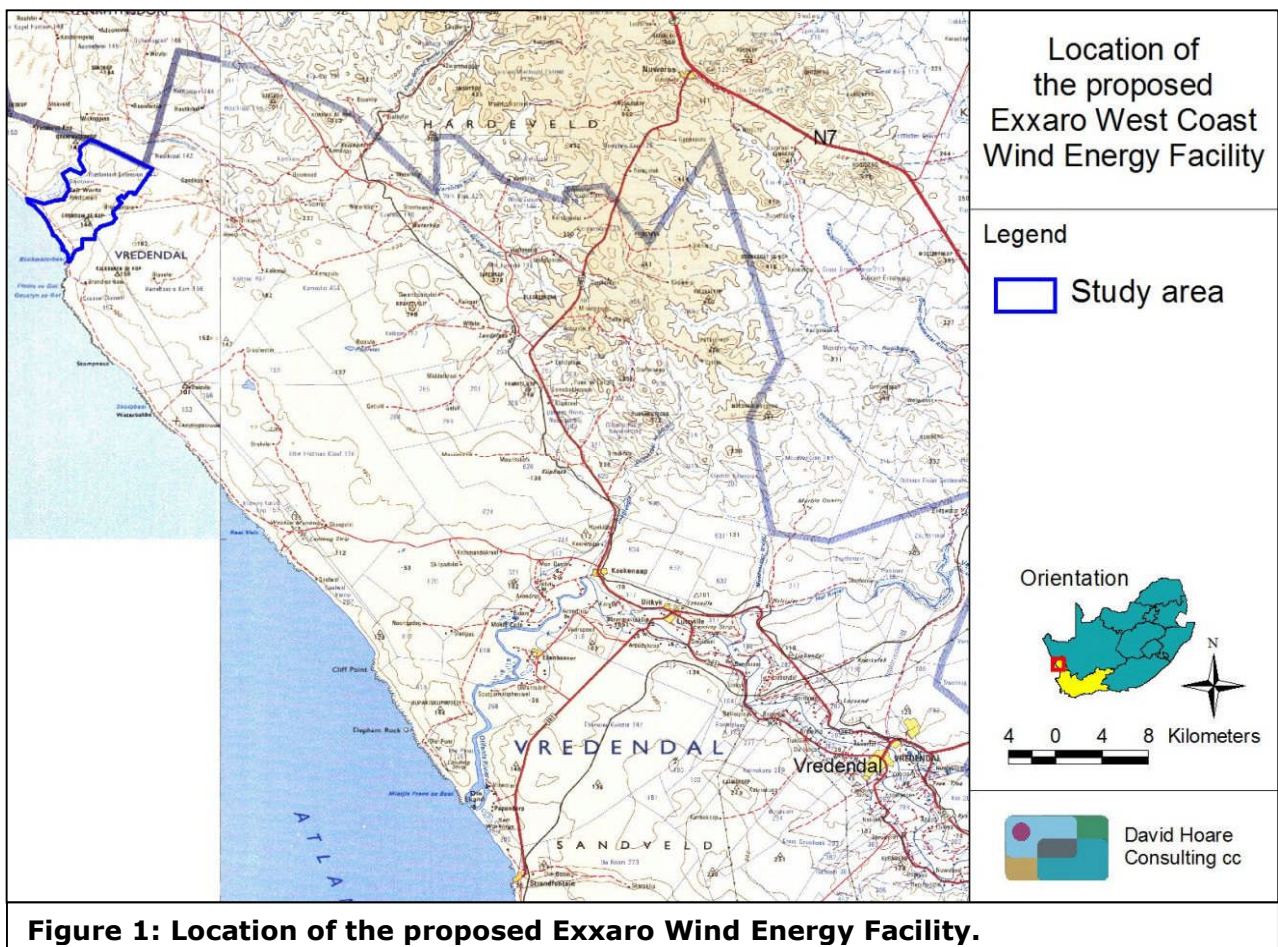
### Location

The study site is situated south-west of Bitterfontein in the Western Cape Province and falls within the quarter degree grids 3117BB and 3117BD (Figure 1). Bitterfontein is a small town situated along the N7 national road to the north of Vredendal. The site is not directly accessible from Bitterfontein, except by small, tertiary roads. There is a main road from Vredendal northwards (the R363), which turns inland to join the N7 at Nuwerus, just to the south of Bitterfontein. A smaller road branches from the R363 at this turn and runs between the coast and the N7 inland of the site. Various small gravel roads lead from this secondary road towards and onto the site. The site is therefore connected to roads that connect to regional routes, but is relatively isolated.

The farm portions on which the proposed wind energy facility would occur is the following: Rietfontein extension 151. This property falls within Exxaro-owned land. No alternative site is currently being considered for the proposed wind energy facility.

### Landuse / landcover

A landcover map of the study area (Fairbanks *et al.* 2000) indicates that most of the site consists of natural vegetation with a few small patches of cultivation. The Surveyor General's 1:50 000 topocadastral maps for the study area indicates that mining activities have occurred across significant parts of the area to the south-east of the site, but that the site itself is



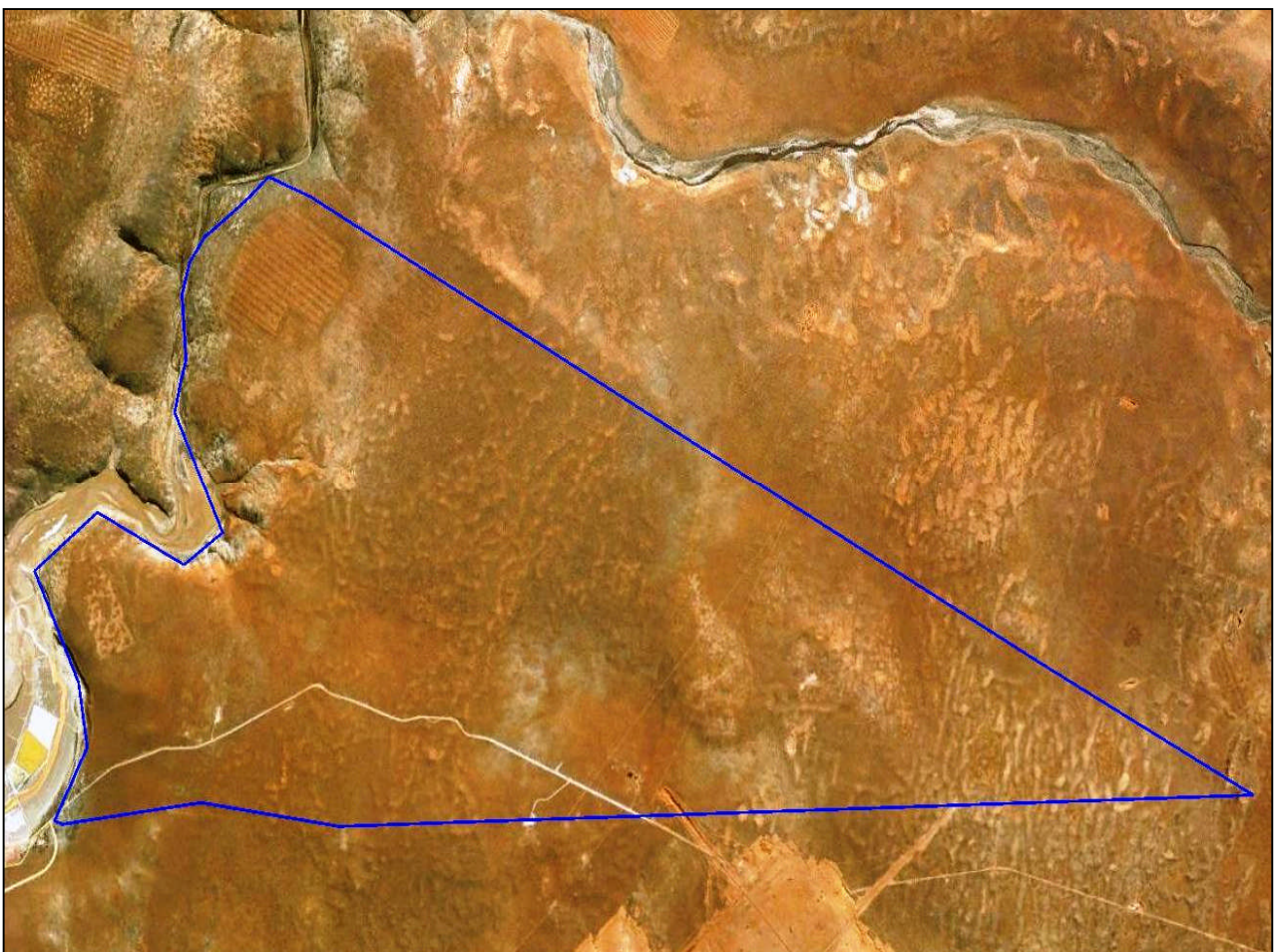
natural (Figure 2).

Based on these two sources and fieldwork undertaken on site, it is clear that most of the site is in a natural condition. There are therefore likely to be significant areas on site that could potentially support populations of animals, depending on their habitat requirements.

The site occurs within two main vegetation types: Namaqualand Sand Fynbos and Namaqualand Strandveld (Mucina *et al.* 2005, Mucina & Rutherford 2006). There are, however, also areas adjacent to the Groot Goerap River, which runs along the northern boundary of the site, that may have habitats characterised by being within this riparian system. Vegetation types associated with the river are Knersvlakte Quartz Vygieveld and Arid Estuarine Salt Marshes. Along the coastline are areas classified as Namaqualand Seashore Vegetation. There are therefore a number of different habitat types within close proximity to the site that may provide suitable habitat for a variety of faunal species.

### **Red List animal species of the study area**

All Red List vertebrates (mammals, reptiles, amphibians) that have a geographical distribution that includes the study area are listed in Appendix 1. Birds are covered in a separate specialist study and are not included here. Based on habitat requirements, there is one species previously listed as threatened that is considered to have a high possibility of occurring on site or making use of habitats available on site, i.e. Grant's Golden Mole. This species was originally listed as VU, but is currently considered by the IUCN to be LC (Least Concern). It is therefore not considered as a potential issue on site.



**Figure 2: Aerial image of the site of the proposed Exxaro Wind Energy Facility.**

An additional species of potential conservation concern that was evaluated as potentially occurring on site is the Namaqua Plated Lizard (NT). This species occurs in dry sandy areas and bare rocky hillsides. The entire site is therefore potential habitat for this species, but the species is more likely to occur on the slopes overlooking the river on the western side of the site. The species is classified as Near Threatened, which is not a threatened (Red List ) category, but indicates that the species may become threatened in the near future. The species is therefore of lesser conservation concern. A recent assessment of reptiles of southern Africa (Alexander & Marais 2008) considers the species to be more widespread than previously known and that the IUCN status of near threatened is not warranted.

There is also one near threatened bat species, Natal Long-fingered Bat (NT), that has a geographical distribution that includes the site and there is some possibility that it may be encountered on site. This species roosts in large numbers in suitable caves. This species is highly dependant on suitable cave roosting sites. There is no suitable roosting habitat on site. The nearest recorded locality is in the mountains adjacent to Klawer, approximately 100 km from the site (Monadjem *et al.* 2010). Any individuals of this species on site are therefore likely to only be vagrants or far-travelling foraging individuals.

None of these species are protected according to section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

In summary, the following species are of potential concern for development of this site:

- Namaqua Plated Lizard (NT);
- Natal Long-fingered Bat (NT).

Note that both of these species are classified as near threatened, which is a lower category than any threatened category.

### **Protected animal species of the study area**

Various mammal species are protected in the Western Cape, including insectivores, primates, bats and carnivores. All amphibians are protected in the Western Cape. Amphibians include frogs and toads. Amongst reptiles, all lizards, tortoises, turtles and snakes of the families Typhlopidae, Leptotyphlopidae and Colubrinae are protected in the Western Cape. Lizards are a diverse group and include agamas, chameleons (including dwarf chameleons), monitors, lacertids, amphisbaenids, skinks, cordylids, plated lizards and geckos.

A complete list of protected species for the Western Province may be found in Schedule 2 of the Western Cape Nature Conservation Laws Amendment Act of 2000 (Act 3 of 2000). Those that are classified as threatened or near threatened also appear in Appendix 1 of this report and have been discussed in the section above. The species in this Schedule for which there is conservation concern have, therefore, already been addressed in this study.

According to the Western Cape Nature Conservation Laws Amendment Act of 2000 (Act 3 of 2000), Section 26, "*No person shall without a permit hunt or be in possession of any endangered wild animal or the carcass of any such animal*". This Act provides no specific permit requirements in the case where a protected species may be affected by a proposed development. The implication of this Act is that if such a species occurs on site, it should not be hunted or possessed by any member of the construction or management team. There appears to be no legal obligation to obtain environmental authorization to negatively impact upon a protected species listed in this Act.

## 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 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.

#### *Sea Birds and Seals Protection Act No. 46 of 1973*

Provides protection for certain species of marine birds, including the Damara Tern and the Bank Cormorant.

#### *The Nature and Environmental Conservation Ordinance, 1974 (Ordinance 19 of 1974)*

Provides for protection of fauna and flora in the Western Cape Province.

*The Western Cape Nature Conservation Laws Amendment Act, 2000 (Ordinance 3 of 2000)*

Provides for the amendment of various laws on nature conservation in order to transfer the administration of the provisions of those laws to the Western Cape Nature Conservation Board. Also provides updated lists of endangered and protected fauna and flora for the Province.

*National Water Act*

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

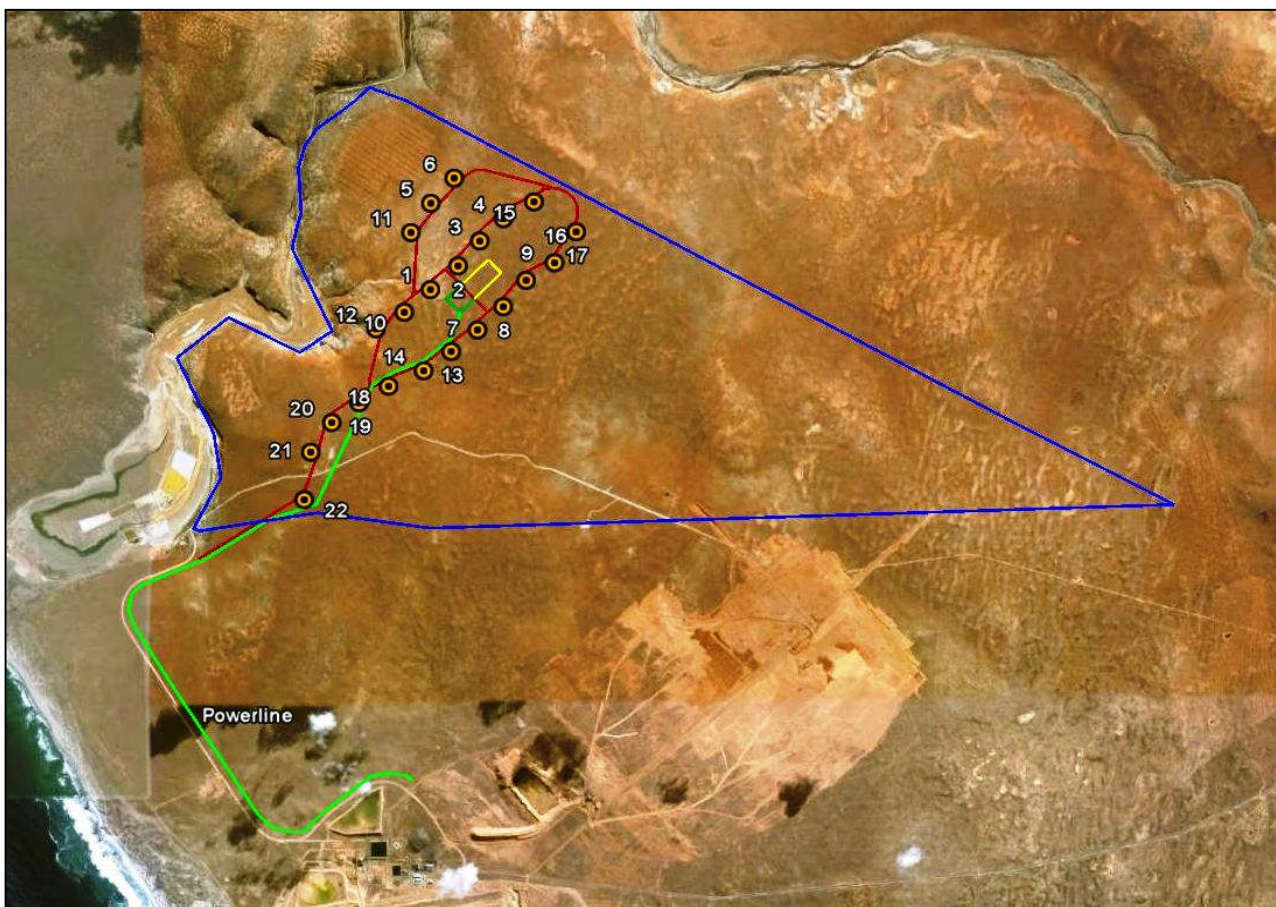
Any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

## DESCRIPTION OF INFRASTRUCTURE

A total of 22 turbines have been proposed for the site. Each turbine will have a relatively small footprint (i.e. 15 m x 15m). There will be disturbance beyond this during the construction phase since a lay-down area is required prior to raising the turbine to its final position. A single lay-down area is proposed in the centre of the turbine cluster (yellow block in Figure 3).

The power line from the wind energy facility to the substation and to the grid will be a 132kV line. This will consist of two lines in parallel in order to loop into the existing line at Brand se Baai (green line in Figure 3). The substation will be 80 m x 90 m in extent (green block in Figure 3). There is 1 internal substation. The internal underground cables for connecting turbines to one another and internal access roads to turbines are planned to co-incide (red lines in Figure 3).

The position of the turbines, substation, internal underground cables and overhead power line in the study area is indicated in Figure 3.



**Figure 3: Infrastructure positions in relation to site boundaries.**

## **IDENTIFICATION OF RISKS AND POTENTIAL IMPACTS**

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

- Impacts on biodiversity: this includes any impacts on populations of individual species of concern.
- Impacts on sensitive habitats: this includes impacts on any habitats that are important for threatened fauna.
- 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 habitats and ecosystems or loss or change in ecosystem function.

- Secondary and cumulative impacts on fauna: 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.

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.
- Placement of underground cables linking turbines.
- 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.

There are also risks associated with operation of the proposed WEF, as follows:

- Collisions with flying animals (primarily bats). This may have local impacts on populations as well as cumulative effects on species over wider areas.
- Maintenance of surrounding vegetation as part of management of WEF.

### **Description of potential impacts**

Major potential impacts are described briefly below. These were originally 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 bat mortality and loss of habitat for other species.

### ***Impact 1: Loss of habitat for threatened fauna***

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. Construction of pylons, access roads, transmission lines and other infrastructure associated with the wind farm will lead to direct loss of habitat. There are significant areas of natural habitat remaining on site.

For any species of low conservation concern a loss of individuals or localised 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. 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.

It has been evaluated that there is one Near Threatened species with a high chance of occurring on site, i.e. the Namaqua Plated Lizard. This species is found in dry sandy areas and bare rocky hillsides. It could occur anywhere on site, but is more likely to occur on the slopes overlooking the river on the western side of the site. A recent assessment of reptiles of southern Africa (Alexander & Marais 2008) considers the species to be more widespread than previously known and that the IUCN status of NT is not warranted.

### ***Impact 2: Collisions of bats with infrastructure***

Nature: Bird and bat deaths are one of the most controversial biological issues related to wind turbines. The deaths of birds and bats at wind farm sites have raised concerns by conservation agencies internationally. Bats have been found to be particularly vulnerable to being killed by wind turbines. It has long been a mystery why they should be so badly affected since bat echo-location allows them to detect moving objects very well. A recent study in America has found that the primary cause for mortality is a combination of direct strikes and barotrauma (bats are killed when suddenly passing through a low air pressure region surrounding the turbine blade tips causing low pressure damage the bat's lungs (Baerwald *et al.* 2008). The relative importance of this impact on bat populations depends on which species are likely to be affected, the importance of the site for those species and whether the site is within a migration corridor for particular bat species.

The most vulnerable species are those that are already classified as threatened species, including 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 unless the impact occurs across a wide area that co-incides with their overall distribution range. Loss of a population or individuals could lead to a direct change in the conservation status of the species. 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.

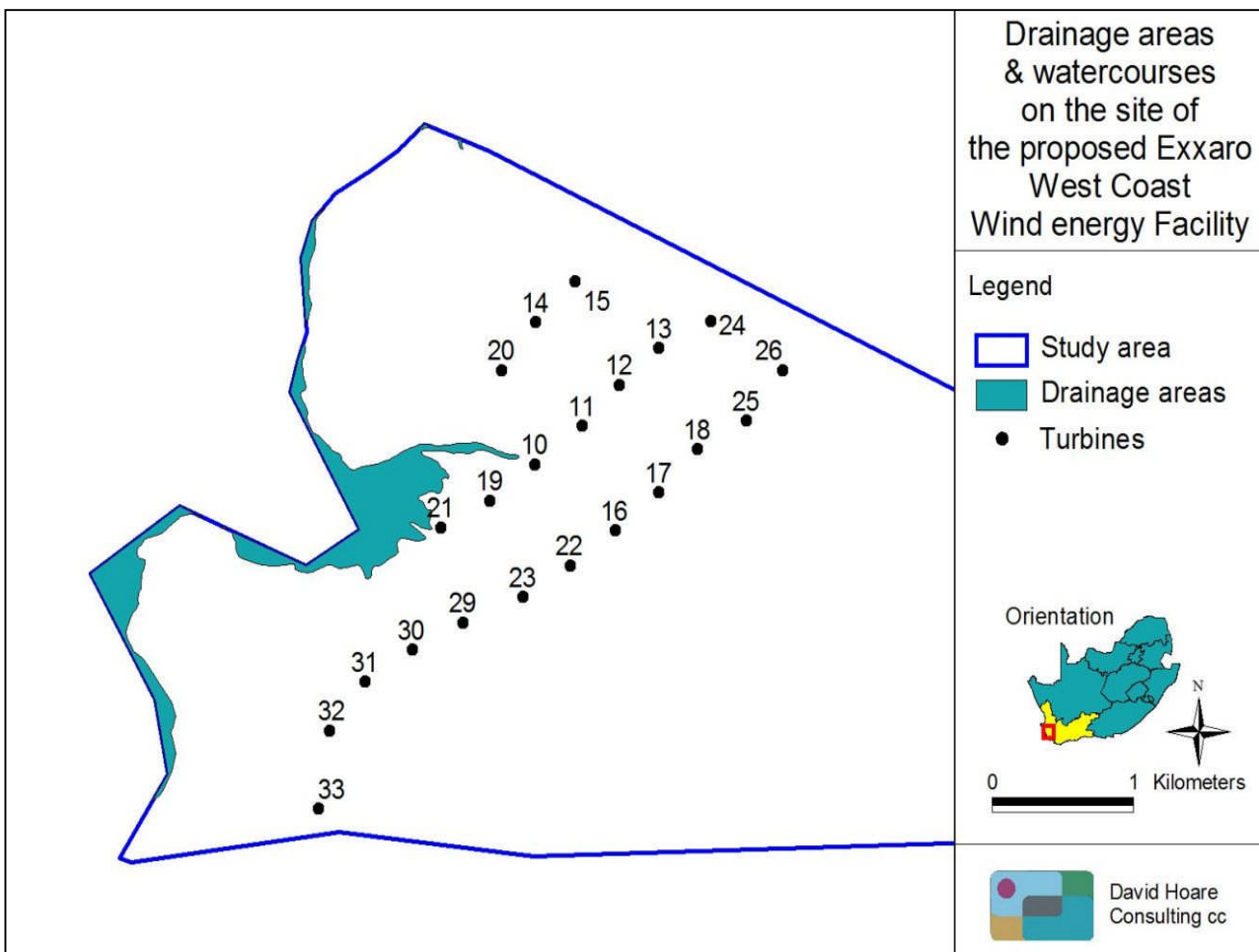
These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species' overall survival chances.

It has been evaluated that there is one near threatened bat species that could potentially be affected by the proposed wind energy facility, i.e. the Natal Long-fingered Bat (NT). This species is highly dependant on suitable cave roosting sites. The nearest recorded locality is in the mountains adjacent to Klawer, approximately 100 km from the site (Monadjem *et al.* 2010). Any individuals of this species on site are therefore likely to only be vagrants or far-travelling foraging individuals.

**Impact 3: Impacts on watercourses, wetlands or drainage areas**

Construction may lead to some direct or indirect loss of or damage to wetlands or drainage lines or impacts that affect the catchment of these areas. This will lead to localised loss of such 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;



**Figure 4: Watercourses and drainage areas in the study area.**

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 slopes overlooking the main river in which shallow drainage areas occur. These are shown in Figure 4. No turbines or underground cables are within drainage areas, but an internal access road (between turbines 19 and 20) will cross a small section of drainage line.

## ASSESSMENT OF IMPACTS

Impacts are assessed for each component of infrastructure for the proposed wind energy facility, as follows:

- wind turbines;
- substation;
- overhead power line (132kV);
- underground cables between turbines and linking turbines to internal substations
- internal access roads.

### Wind turbines

#### Impact 1: Impacts on threatened animals

It has been evaluated that there is one near threatened animal species that could potentially be affected by the proposed construction of wind turbines on site, the Namaqua Plated Lizard (NT). This species is most likely to be affected by the construction of the turbines to a greater extent than the operation of the wind energy facility.

Extent: The impact will occur at the site of the proposed WEF, specifically at the scale of the individual infrastructure within the site. At its greatest extent this may affect some parts of the site, but according to the proposed layout is likely to only affect a small proportion of suitable habitat on site.

Duration: The impact will either be of short-term duration (construction phase only) or of permanent duration if it leads to loss of habitat for the species.

Magnitude: The potential impact will be minor (will not result in an impact on population processes).

Probability: It is improbable that the impact will occur (some possibility but low likelihood).

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened animal species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1)	local (1)
<b>Duration</b>	permanent (5)	permanent (5)
<b>Magnitude</b>	minor (2)	minor (2)
<b>Probability</b>	improbable (2)	Improbable (2)
<b>Significance</b>	<b>low (16)</b>	<b>low (16)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Not required	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b>		

Any other infrastructure could cause similar impacts.
<b>Residual Impacts:</b> None.

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

**Impact 2: Impacts on bats**

It has been evaluated that there is one near threatened bat species that could potentially be affected by the proposed wind energy facility, the Natal long-fingered bat (NT). This species is most likely to be affected by the operation of the WEF to a greater extent than the construction of the WEF. There is a low likelihood of this species occurring on site and any individuals possibly occurring on site are likely to be vagrants from far-off colonies.

Extent: The impact will occur at the site of the proposed WEF, but will have an impact at a more regional level, since it affects entire populations of affected species and may affect migration routes of species.

Duration: The impact will be of long-term duration, because it will occur for the entire duration of the operation of the wind energy facility.

Magnitude: Due to the low likelihood of encountering this species on site, the low likelihood of breeding populations occurring nearby and the lower conservation status of this species, the potential magnitude of this impact is considered to be minor (will not result in an impact on (population) processes).

Probability: No known populations of the bat species occur in the grid in which the site is located. The probability of the impact occurring is therefore relatively low and is scored as improbable.

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened bat species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	regional (3)	regional (3)
<b>Duration</b>	long-term (4)	long-term (4)
<b>Magnitude</b>	minor (2)	minor (2)
<b>Probability</b>	improbable (2)	improbable (2)
<b>Significance</b>	<b>low (18)</b>	<b>low (18)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Not required	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Other WEFs in general area could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

**Impact 3: Impacts on watercourses**

There are a small number of watercourses and drainage areas on site that could potentially be affected by the proposed construction of turbines. No turbines are within drainage areas or watercourses. No impact will therefore arise from this activity and it is scored as zero.

**Substation**

**Impact 1: Impacts on threatened animals**

It has been evaluated that there is one near threatened animal species that could potentially be affected by the proposed construction of substations on site, the Namaqua Plated Lizard (NT). This species is most likely to be affected by the construction of the substation to a greater extent than the operation of the substation.

Extent: The impact will occur at the site of the substation. This will only affect a small proportion of suitable habitat on site.

Duration: The impact will either be of short-term duration (construction phase only) or of permanent duration if it leads to loss of habitat for the species.

Magnitude: The potential impact will be small (will have no effect on the environment).

Probability: It is highly improbable that the impact will occur (probably will not happen).

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened animal species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1)	local (1)
<b>Duration</b>	permanent (5)	permanent (5)
<b>Magnitude</b>	small (1)	small (1)
<b>Probability</b>	Highly improbable (1)	Highly improbable (1)
<b>Significance</b>	<b>low (7)</b>	<b>low (7)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Not applicable	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Any other infrastructure could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

**Impact 2: Impacts on bats**

It has been evaluated that there is one near threatened bat species that could potentially be affected by the proposed wind energy facility, the Natal long-fingered bat (NT). This species is most likely to be affected by the operation of the WEF to a greater extent than the construction of the substation. There is a low likelihood of this species occurring on site and any individuals possibly occurring on site are likely to be vagrants from far-off colonies.

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

Duration: The impact will be of long-term duration, because it will occur for the entire duration of the operation of the wind energy facility.

Magnitude: Due to the low likelihood of encountering this species on site, the low likelihood of breeding populations occurring nearby, the lower conservation status of this species and the minimal effect that a substation is likely to have, the potential magnitude of this impact is considered to be small (will have no effect on the environment).

Probability: No known populations of the bat species occur in the grid in which the site is located. If any bats occur on site they are unlikely to be affected by the existence of the substation. The probability of the impact occurring is therefore very low and is scored as highly improbable.

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened bat species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	regional (3)	regional (3)
<b>Duration</b>	long-term (4)	long-term (4)
<b>Magnitude</b>	small (0)	small (0)
<b>Probability</b>	Highly improbable (1)	Highly improbable (1)
<b>Significance</b>	<b>low (7)</b>	<b>low (7)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Other WEFs in general area could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

**Impact 3: Impacts on watercourses**

There are a small number of watercourses and drainage areas on site that could potentially be affected by the proposed construction of turbines. The proposed substation is not within drainage areas or watercourses. No impact will therefore arise from this activity and it is scored as zero.

## Overhead power line

### **Impact 1: Impacts on threatened animals**

It has been evaluated that there is one near threatened animal species that could potentially be affected by the proposed construction of powerlines on site, the Namaqua Plated Lizard (NT). This species is most likely to be affected by the construction of the power line to a greater extent than the operation of the power line due to habitat disturbance.

Extent: The impact will occur at the site of the proposed powerline. At its greatest extent this may affect some parts of the site, but according to the proposed layout is likely to only affect a small proportion of suitable habitat on site.

Duration: The impact will be of short-term duration (construction phase only).

Magnitude: The potential impact will be minor (will not result in an impact on population processes).

Probability: It is improbable that the impact will occur (some possibility but low likelihood).

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened animal species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1)	local (1)
<b>Duration</b>	Short-term (2)	Short-term (2)
<b>Magnitude</b>	small (1)	small (1)
<b>Probability</b>	Highly improbable (1)	Highly improbable (1)
<b>Significance</b>	<b>low (4)</b>	<b>low (4)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Not applicable	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Any other infrastructure could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

### **Impact 2: Impacts on bats**

It has been evaluated that there is one near threatened bat species that could potentially be affected by the proposed wind energy facility, the Natal long-fingered bat (NT). This species is most likely to be affected by the operation of the powerline to a greater extent than the construction of the power line. There is a low likelihood of this species occurring on site and any individuals possibly occurring on site are likely to be vagrants from far-off colonies.

Individuals are not likely to be affected by the powerline to any significant degree since they are capable of detecting the presence of the powerline using echolocation (although they may "switch off" their echolocation).

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

Duration: The impact will be of long-term duration, because it will occur for the entire duration of the operation of the wind energy facility.

Magnitude: Due to the low likelihood of encountering this species on site, the low likelihood of breeding populations occurring nearby, the lower conservation status of this species and the minimal effect that a powerline is likely to have on populations, the potential magnitude of this impact is considered to be small (will have no effect on the environment).

Probability: No known populations of the bat species occur in the grid in which the site is located. If any bats occur on site they are unlikely to be affected by the existence of the powerline (they have echolocation abilities and are unlikely to collide with powerline cables). The probability of the impact occurring is therefore very low and is scored as highly improbable.

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened bat species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	regional (3)	regional (3)
<b>Duration</b>	long-term (4)	long-term (4)
<b>Magnitude</b>	small (0)	small (0)
<b>Probability</b>	Highly improbable (1)	Highly improbable (1)
<b>Significance</b>	<b>low (7)</b>	<b>low (7)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Other WEFs in general area could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

### **Impact 3: Impacts on watercourses**

There are a small number of watercourses and drainage areas on site that could potentially be affected by the proposed construction of turbines. No power lines are within drainage areas or watercourses. No impact will therefore arise from this activity and it is scored as zero.

## Underground cables

### **Impact 1: Impacts on threatened animals**

It has been evaluated that there is one near threatened animal species that could potentially be affected by the proposed construction of underground cables between wind turbines on site, the Namaqua Plated Lizard (NT). This species is most likely to be affected by the construction of the underground cables to a greater extent than the operation of the wind energy facility.

Extent: The impact will occur at the site of the proposed WEF, specifically at the scale of the individual infrastructure within the site. At its greatest extent this may affect some parts of the site, but according to the proposed layout is likely to only affect a moderate proportion of suitable habitat on site.

Duration: The impact will either be of medium-term duration (construction phase only) until a perennial vegetation cover has become re-established in disturbed areas.

Magnitude: The potential impact will be low (will cause a slight impact on processes).

Probability: It is improbable that the impact will occur (some possibility but low likelihood). (There will be an impact on habitat, but it is not certain that the species occurs on site).

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened animal species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1)	local (1)
<b>Duration</b>	Medium-term (3)	Medium-term (3)
<b>Magnitude</b>	low (4)	low (3)
<b>Probability</b>	improbable (2)	Improbable (2)
<b>Significance</b>	<b>low (16)</b>	<b>low (14)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b> (1) Re-habilitate disturbed areas to ensure vegetation re-growth occurs.		
<b>Cumulative impacts:</b> Any other infrastructure could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

### **Impact 2: Impacts on bats**

It has been evaluated that there is one near threatened bat species that could potentially be affected by the proposed wind energy facility, the Natal long-fingered bat (NT). This species is most likely to be affected by the operation of the WEF to a greater extent than burial of underground cables. There is a low likelihood of this species occurring on site and any

individuals possibly occurring on site are likely to be vagrants from far-off colonies. Individuals are very unlikely to be affected by the buried underground cables to any significant degree.

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

Duration: The impact will be of short-term duration, until a perennial vegetation cover has re-established in affected areas.

Magnitude: Due to the low likelihood of encountering this species on site, the low likelihood of breeding populations occurring nearby, the lower conservation status of this species and the minimal effect that a buried underground cable is likely to have on populations, the potential magnitude of this impact is considered to be small (will have no effect on the environment).

Probability: No known populations of the bat species occur in the grid in which the site is located. If any bats occur on site they are unlikely to be affected by the existence of the powerline (they have echolocation abilities and are unlikely to collide with powerline cables). The probability of the impact occurring is therefore very low and is scored as highly improbable.

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened bat species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	regional (3)	regional (3)
<b>Duration</b>	short-term (2)	short-term (2)
<b>Magnitude</b>	small (0)	small (0)
<b>Probability</b>	Highly improbable (1)	Highly improbable (1)
<b>Significance</b>	<b>low (5)</b>	<b>low (5)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Other WEFs in general area could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

### **Impact 3: Impacts on watercourses**

An underground cable (between turbines 19 and 20) will cross a small section of drainage line (see Figure 4).

Extent: The impact will be local, although downstream areas could be affected.

Duration: The impact will be of permanent duration.

**Magnitude:** The potential magnitude of the impact could be moderate (will result in processes continuing but in a modified way).

**Probability:** According to the current position of the underground cables, it is definite that the impact will occur.

**Potential significance:** The overall significance of the impact is rated as high.

**Mitigation measures:** Re-route the underground cable around the drainage line. Stormwater and runoff water must be controlled and managed to avoid impacts on watercourses. A permit from DWA is required if there are expected to be any impacts on any wetland or water resources.

<b>Nature: Impacts on watercourses.</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local and surroundings (2)	local and surroundings (2)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	definite (5)	Improbable (2)
<b>Significance</b>	<b>high (65)</b>	<b>low (22)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Reversible with effective rehabilitation	Reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b>		
(1) Re-route the underground cable around the drainage line OR (2) obtain a permit from DWA to impact on any wetland or water resource. (3) rehabilitate any disturbed areas immediately to stabilise landscapes (4) Proper culvert and bridge structures are required for permanent roads. (5) Erosion control measures must be put in place to prevent loss of substrates downstream and/or siltation of downstream areas		
<b>Cumulative impacts:</b>		
None.		
<b>Residual Impacts:</b>		
Despite proposed mitigation measures, it is expected that this impact will still occur to some degree.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

## **Internal access roads**

### **Impact 1: Impacts on threatened animals**

It has been evaluated that there is one near threatened animal species that could potentially be affected by the proposed construction of internal access roads on site, the Namaqua Plated Lizard (NT). This species is most likely to be affected by the construction of the internal access roads to a greater extent than the operation of the wind energy facility.

**Extent:** The impact will occur at the site of the proposed WEF, specifically at the scale of the individual infrastructure within the site. At its greatest extent this may affect some parts of the

site, but according to the proposed layout is likely to only affect a moderate proportion of suitable habitat on site.

Duration: The impact will either be of permanent duration (will lead to loss of habitat for the species).

Magnitude: The potential impact will be moderate (will result in processes continuing but in a modified way).

Probability: It is improbable that the impact will occur (some possibility, but low likelihood because presence of species on site is uncertain).

Potential significance: The overall significance of the impact is rated as low.

Mitigation measures: None proposed.

<b>Nature: Impacts on individuals of threatened animal species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1)	local (1)
<b>Duration</b>	permanent (5)	permanent (5)
<b>Magnitude</b>	moderate (6)	moderate (6)
<b>Probability</b>	improbable (2)	improbable (2)
<b>Significance</b>	<b>low (24)</b>	<b>low (24)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Not applicable	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Any other infrastructure could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

**Impact 2: Impacts on bats**

It has been evaluated that there is one near threatened bat species that could potentially be affected by the proposed wind energy facility, the Natal long-fingered bat (NT). This species is most likely to be affected by the operation of the WEF to a greater extent than the construction of the internal access roads. There is a low likelihood of this species occurring on site and any individuals possibly occurring on site are likely to be vagrants from far-off colonies. Individuals are not likely to be affected by the internal access roads to any significant degree.

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

Duration: The impact will be of permanent duration, because loss of habitat for construction of roads is irreversible.

**Magnitude:** Due to the low likelihood of encountering this species on site, the low likelihood of breeding populations occurring nearby, the lower conservation status of this species and the minimal effect that roads are likely to have on populations, the potential magnitude of this impact is considered to be small (will have no effect on the environment).

**Probability:** No known populations of the bat species occur in the grid in which the site is located. If any bats occur on site they are unlikely to be affected by the existence of the internal access roads, except for a minimal loss of habitat for foraging. The probability of the impact occurring is therefore very low and is scored as highly improbable.

**Potential significance:** The overall significance of the impact is rated as low.

**Mitigation measures:** None proposed.

<b>Nature: Impacts on individuals of threatened bat species</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	regional (3)	regional (3)
<b>Duration</b>	long-term (4)	long-term (4)
<b>Magnitude</b>	small (0)	small (0)
<b>Probability</b>	Highly improbable (1)	Highly improbable (1)
<b>Significance</b>	<b>low (7)</b>	<b>low (7)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b> (1) None proposed.		
<b>Cumulative impacts:</b> Other WEFs in general area could cause similar impacts.		
<b>Residual Impacts:</b> None.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

**Impact 3: Impacts on watercourses**

There are a small number of watercourses and drainage areas on site that could potentially be affected by the proposed construction of turbines. An internal access road (between turbines 19 and 20) will cross a small section of drainage line (see Figure 4).

**Extent:** The impact will be local, although downstream areas could be affected.

**Duration:** The impact will be permanent.

**Magnitude:** The potential magnitude of the impact could be moderate (will result in processes continuing but in a modified way).

**Probability:** According to the current position of the internal access roads, it is definite that the impact will occur.

**Potential significance:** The overall significance of the impact is rated as high.

Mitigation measures: Re-route the internal access road to avoid the drainage areas. Stormwater and runoff water must be controlled and managed to avoid impacts on watercourses. A permit from DWA is required if there are expected to be any impacts on any wetland or water resources.

<b>Nature: Impacts on watercourses.</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local and surroundings (2)	local and surroundings (2)
<b>Duration</b>	Permanent (5)	Medium-term (3)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	definite (5)	Improbable (2)
<b>Significance</b>	<b>high (65)</b>	<b>low (27)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Reversible with effective rehabilitation	Reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b>		
<ol style="list-style-type: none"> <li>1. Re-route the internal access road to avoid the drainage areas ORobtain a permit from DWA to impact on any wetland or water resource.</li> <li>2. rehabilitate any disturbed areas immediately to stabilise landscapes</li> <li>3. Proper culvert and bridge structures are required for permanent roads.</li> <li>4. Erosion control measures must be put in place to prevent loss of substrates downstream and/or siltation of downstream areas</li> </ol>		
<b>Cumulative impacts:</b>		
None.		
<b>Residual Impacts:</b>		
Despite proposed mitigation measures, it is expected that this impact will still occur to some degree.		

\*Significance calculated as (magnitude+duration+extent) x probability. Significance: <30 = low, 30-60 = medium, >60 = high.

## **DISCUSSION AND CONCLUSIONS**

Most of the study area is in a natural state and may provide habitat for faunal species of conservation concern. The suitability of the habitat on site for various species considered to possibly occur in the area was determined during field surveys. Habitat requirements are provided in the appendices to this report. It was determined that two species of lower conservation concern could occur on site or in the general surroundings and could, therefore, be affected by the proposed wind energy facility.

A risk assessment was undertaken which identified two main potential negative impacts on fauna and wetlands/watercourses. The significance of these impacts was assessed during this EIA study. The identified potential impacts are the following:

1. Impacts on habitats of non-flying threatened fauna. The species most likely to be significantly affected is the Namaqua Plated Lizard (NT).
2. Impacts due to collision of bats with infrastructure. The species most likely to be affected is the Natal long-fingered bat (NT).
3. Impacts on watercourses. A small number of drainage lines are present in the western side of the site.

The Namaqua Plated Lizard (NT) is found in dry sandy areas and bare rocky hillsides. It could occur anywhere on site, but is more likely to occur on the slopes overlooking the river on the western side of the site. A recent assessment of reptiles of southern Africa (Alexander & Marais 2008) considers the species to be more widespread than previously known and that the IUCN status of NT is not warranted. Only a small proportion of available habitat for this species on site will be affected by the construction of the proposed wind energy facility and it was considered that this would have a minor effect on the species across its entire distribution range.

The Natal Long-fingered Bat (NT) is highly dependant on suitable cave roosting sites. The nearest recorded locality is in the mountains adjacent to Klawer, approximately 100 km from the site (Monadjem *et al.* 2010). Any individuals of this species on site are therefore likely to only be vagrants or far-travelling foraging individuals. Due to the low likelihood of encountering this species on site, the low likelihood of breeding populations occurring nearby and the lower conservation status of this species, it was evaluated that the proposed wind energy facility would have a minor effect on the species across its entire distribution range.

Impacts were assessed and it emerged that all potential impacts, except one, have low significance. The impact of internal access roads and underground cables on watercourses on site could potentially be of high significance (due to the fact that they would be permanent and would definitely occur, given the current layout). Some proposed mitigation measures are provided that reduce the significance of impacts further and help to limit impacts associated with the proposed wind energy facility. The potential impacts on watercourses can be avoided by slightly re-routing the alignment of underground cables and internal access roads.

## **Conclusions**

The overall impacts of the proposed project have been assessed as largely being of low significance (see Table 3 below). If mitigation measures are put in place to manage impacts, then all potential impacts can be reduced to having low significance. The proposed project is therefore considered to be acceptable in terms of potential impacts on fauna and drainage lines / watercourses and it is recommended that it should be permitted to go ahead.

**Table 3: Summary of the significance of impacts for different infrastructure components before and after mitigation.**

Impacts on:	Wind turbines		Substations		Overhead powerline		Underground cables		Internal access roads	
	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
<b>1. threatened animals</b>	low (16)	low (16)	low (7)	low (7)	low (4)	low (4)	low (16)	low (14)	low (24)	low (24)
<b>2. bats</b>	low (18)	low (18)	low (7)	low (7)	low (7)	low (7)	low (5)	low (5)	low (7)	low (7)
<b>3. watercourses &amp; drainage areas</b>	zero (0)	zero (0)	zero (0)	zero (0)	zero (0)	zero (0)	high (65)	low (27)	high (65)	low (27)

## MANAGEMENT PLAN

Control measures are only proposed for those impacts where mitigation measures are required to reduce the significance of impacts, i.e. some impacts are of low significance and thus no mitigation measures are proposed or no mitigation measures are possible or required.

<b>OBJECTIVE: Limit damage to watercourses</b>	
Project component/s	Internal access roads
Potential Impact	Damage to watercourses by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material within wetlands). The focus should be on the functioning of the watercourse as a natural system
Activity/risk source	Construction
Mitigation: Target/Objective	Target: limited damage to watercourses within project area Time period: construction

Mitigation: Action/control	Responsibility	Timeframe
(1) re-route underground cables and internal access roads (2) rehabilitate any disturbed areas as quickly as possible (3) control stormwater and runoff water (4) appoint an independent environmental control officer during construction and an environmental manager during operation whose duty it will be to minimise impacts on surrounding sensitive habitats (5) obtain a permit from DWA to impact on any watercourse.	Planning team; construction team, management, environmental control officer	Planning, construction, operation

Performance Indicator	Limited impacts on natural status of watercourses
Monitoring	<ul style="list-style-type: none"> <li>Habitat loss in watercourses should be monitored before and after construction.</li> <li>The environmental manager should be responsible for driving this process.</li> <li>Reporting frequency: once after construction is complete.</li> </ul>

## REFERENCES:

- ALEXANDER, G. & MARAIS, J. 2008. A guide to the reptiles of southern Africa. Struik, Cape Town.
- BRANCH, W.R. 1988. South African Red Data Book—Reptiles and Amphibians. South African National Scientific Programmes Report No. 151.
- DU PREEZ, L. & CARRUTHERS, V. 2009. A complete guide to the frogs of southern Africa. Random House Struik (Pty) Ltd, Cape Town.
- FRIEDMANN, Y. & DALY, B. (eds.) 2004. The Red Data Book of the Mammals of South Africa: A Conservation Assessment: CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust, South Africa.
- GROOMBRIDGE, B. (ed.) 1994. *1994 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland.
- IUCN (2001). *IUCN Red Data List categories and criteria: Version 3.1*. IUCN Species Survival Commission: Gland, Switzerland.
- MILLS, G. & HES, L. 1997. The complete book of southern African mammals. Struik Publishers, Cape Town.
- MINTER, L.R., BURGER, M., HARRISON, J.A., BRAACK, H.H., BISHOP, P.J. and KLOEPFER, D. (eds.) 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MAB Series #9. Smithsonian Institution, Washington, DC.
- MONADJEM, A., TAYLOR, P.J., COTTERILL, E.P.D. & SCHOEMAN, M.C. 2010. Bats of southern and central Africa. Wits University Press, Johannesburg.
- MUCINA, L. AND RUTHERFORD, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria.
- MUCINA, L., RUTHERFORD, M.C. AND POWRIE, I.W. (editors) 2005. Vegetation map of South Africa, Lesotho and Swaziland, 1:1 000 000 SCALE SHEET MAPS South African National Biodiversity Institute, Pretoria.
- PASSMORE, N.I. & CARRUTHERS, V.C. (1995) South African Frogs; a complete guide. Southern Book Publishers and Witwatersrand University Press. Johannesburg.

**Appendix 1: Threatened vertebrate species with a geographical distribution that includes the current study area.**

**MAMMALS**

Common name	Taxon	Habitat <sup>1</sup>	Status <sup>2</sup>	Likelihood of occurrence
African weasel	<i>Poecilogale albinucha</i>	Moist grassland or woodland with more than 700 mm rainfall per year and where flourishing populations of small rodents occur. Grassland, scrub woodland. The distribution range of this animal covers the west coast of South Africa from Garies southward into the western Cape coastal belt, east and north-east Northern Cape, and all other provinces.	LC	<b>MEDIUM</b> , there is little suitable habitat on site
Natal long-fingered bat	<i>Miniopterus natalensis</i>	Caves and sub-terranean habitats in Fynbos, savanna, woodland, succulent and Nama Karoo, grassland. Found primarily in savannas and grasslands of southern Africa. Cave-dwelling aerial insectivore. Roosts in large numbers in suitable caves.	NT	<b>MEDIUM</b> , not previously recorded in grids, but overall geographical distribution includes this area; no suitable roosting habitat on site, but there may be nearby (Kasteelberg?).
Cape horseshoe bat	<i>Rhinolophus capensis</i>	Caves and subterranean habitats; fynbos, shrubland and Nama-karoo.	LC	<b>HIGH</b> , previously recorded in neighbouring grid and there may be suitable habitat on site or nearby.
Geoffroy's horseshoe bat	<i>Rhinolophus clivus</i>	Caves and subterranean habitats; fynbos, shrubland, grassland, succulent and Nama-karoo; insectivore	LC	<b>HIGH</b> , previously recorded in neighbouring grid and there may be suitable habitat on site or nearby
Cape Golden Mole	<i>Chrysochloris asiatica</i>	Subterranean habitats; arable land; urban areas; renosterveld; fynbos and strandveld succulent karoo; sandy soil	LC	<b>HIGH</b> , not previously recorded in grids, but overall geographical distribution includes this area, substrate properties on site considered to be suitable for this species.
Reddish-grey musk shrew	<i>Crocidura cyanea</i>	Wide variety of habitats. Nocturnal, terrestrial.	LC	<b>MEDIUM</b> , previously recorded in nearby grid.
Grant's golden mole	<i>Eremitalpa granti</i>	Strandveld Succulent Karoo, Namib Desert, in subterranean habitats in shifting sands	LC (listed in Friedmann & Daly 2004 as VU)	<b>HIGH</b> , not previously recorded in grids, but overall geographical distribution includes this area, substrate properties on site are suitable for this species.
Lesser dwarf shrew	<i>Suncus varilla</i>	Broad habitat tolerance. Widespread in Africa and South Africa. Reliant on termite mounds.	LC	<b>HIGH</b> , previously recorded in grid, presence of termite mounds unknown
Namaqua dune mole-rat	<i>Bathyergus janetta</i>	Sandy soils in arid regions on the north-western coast from just north of the Olifants River to Oranjemund.	LC	<b>LOW</b> , site is outside known distribution range
Dassie rat	<i>Petromus typicus</i>	Rocky barren areas on rocky outcrops and koppies. Flat rock crevices. Eats soft vegetable matter, including leaves of shrubs and flowers of many Asteraceae.	LC	<b>LOW</b> , site is just outside known distribution range.

<sup>1</sup>Distribution according to Friedmann & Daly 2004.

<sup>2</sup>Status according to IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. ([www.iucnredlist.org](http://www.iucnredlist.org)). Downloaded on 08 November 2010.

**AMPHIBIANS**

Common name	Species	Habitat	Status <sup>2</sup>	Likelihood of occurrence
none				

<sup>2</sup>Status according to Minter et al. 2004.

## REPTILES

Common name	Species	Habitat	Status	Likelihood of occurrence
Geometric tortoise	<i>Psammobates geometricus</i>	Terrestrial, occurring in flat, low-lying renosterveld habitat of the south-western Cape.	EN <sup>4</sup>	<b>LOW</b> , shell of dead juvenile tent tortoise found on site by heritage specialist. Site is well outside known distribution range of the Geometric Tortoise and specimen on site was probably the similar looking Karoo Tent tortoise, <i>Psammobates tentorius</i> , which occurs in that area.
Armadillo girdled lizard	<i>Cordylus cataphractus</i>	Rock cracks and crevices. Diet consists mainly of termites, beetles and grasshoppers	VU <sup>4</sup>	<b>LOW</b> , within known distribution range; habitat on site not suitable.
Namaqua plated lizard	<i>Gerrhosaurus typicus</i>	Dry sandy areas and bare rocky hillsides	NT <sup>4</sup>	<b>HIGH</b> , overall geographical distribution includes this area; habitat on site is suitable and may occur on site
Black spitting cobra	<i>Naja nigricollis woodi</i>	Favours rocky terrain, dry rocky watercourses. Known from Cedarberg.	RARE <sup>3</sup>	<b>LOW</b> , overall geographical distribution includes this area; no suitable habitat on site.

<sup>3</sup>Status according to Branch 1988.

<sup>2</sup>Status according to IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. ([www.iucnredlist.org](http://www.iucnredlist.org)). Downloaded on 08 November 2010.