ENVIRONMENTAL EIA REPORT:

Specialist fauna study on potential impacts of the proposed Klipheuwel / Dassiesfontein Wind Energy Facility Project, Caledon, Western Cape

Prepared by

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DRAFT EIA REPORT: FIRST 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: the person who prepared the report; and	√		
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 Klipheuwel / Dassiesfontein Wind Energy Facility Project near Caledon in the Western Province. The consulting services comprise an assessment of potential impacts on the fauna 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 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 BioTherm Energy (Pty) Ltd. 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 BioTherm Energy (Pty) Ltd to undertake an application for environmental authorisation through an Environmental Impact Assessment (EIA) for the proposed "Klipheuwel / Dassiesfontein Wind Energy Facility Project." The project involves the establishment of a wind energy facility and associated infrastructure, including 16 wind turbines, undergound cables between turbines, 2 substations and internal access roads. The purpose of the EIA is to identify environmental impacts associated with the project.

In February 2010 David Hoare Consulting cc was appointed by Savannah Environmental (Pty) Ltd to undertake a fauna and wetland assessment of the study area. The specific terms of reference for the faunal 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,

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.

Exclusions

The effect of the WEF on birds will be undertaken in a separate specialist study.

Study area

At a regional level the study area falls within the Western Cape Province to the west of the town of Caledon. 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 and wetlands 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. These can be organised in a hierarchical fashion, as follows:

Species

- threatened animal species

Ecosystems

- critical biodiversity areas
- areas of high biodiversity
- centres of endemism

Processes

- corridors
- 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 is 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:

- Environment Conservation Act (Act 73 of 1989)
- National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998)
- National Environmental Management Biodiversity Act, 2004. (Act 10 0f 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. Barnes 2000, 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 not sensitive.

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 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 ommitting 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 directly west of Caledon in the Western Cape Province and falls within the quarter degree grids 3419AB and 3419 AD (Figure 1). The farm portions on which the proposed wind energy facility would occur include the following: Klip Heuvel no. 410/5 (Remaining Extent) & 410/9; Klip Heuvel no: 410/8 (alias Kruis Vley) & 410/10 (alias Haasjes Kop); Boontjieskraal no. 417/0 and Farm 418 no. 418/0 (Remaining Extent); farm portions 1 (Remaining Extent) & 5 Huveltjes Kraal 426; Heuwelkraal a portion of the farm Pampoenkraal 843/0. No alternative site is currently being considered for the proposed wind energy facility.

The study area is to the south of the N2 coastal road from George to Cape Town. The R43 from Caledon northwards to Villiersdorp and the R320 from Caledon southwards to Hermanus are nearby. The site is therefore well-connected to regional routes. There are various local roads through and onto the site.

Landuse / landcover and vegetation

A landcover map of the study area (Fairbanks *et al*. 2000) indicates that most of the site consists of cultivation with a few small patches of shrubland / low fynbos, thicket and

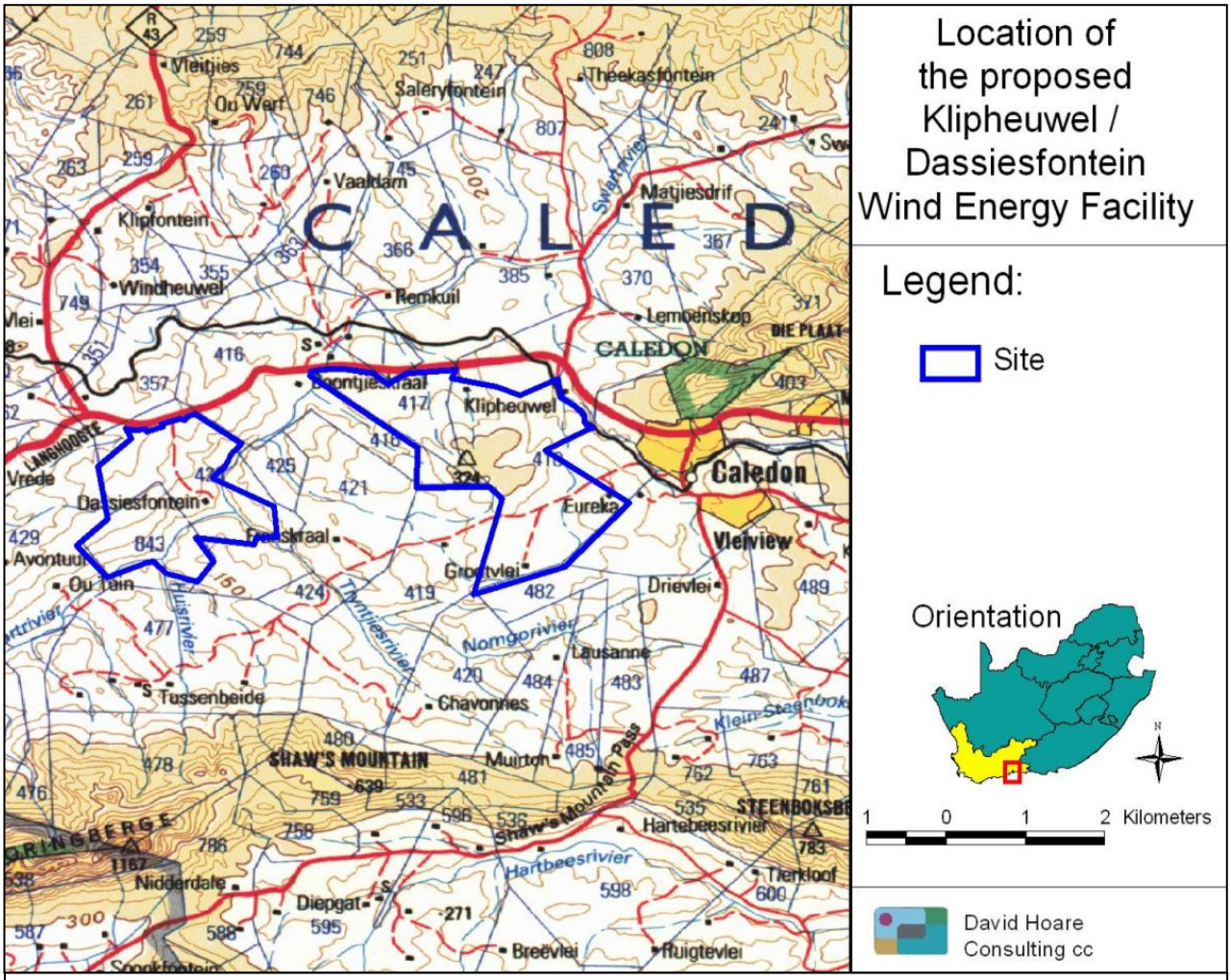

Figure 1: Location of the proposed Wind Energy Facility near Caledon.

grassland (natural). The Surveyor General's 1:50 000 topocadastral maps for the study area and Google imagery support this observation and indicate that cultivation has taken place across most of the proposed development site. The field assessment confirmed these patterns. Large parts of the site were found to be cultivated and remaining areas of natural habitat were often not in pristine condition, or the condition was negatively affected by the proximity of cultivated areas. There are, however, areas that could potentially support unique populations of animals, depending on their habitat requirements.

The study site is located within the Cape Floristic Region (CFR), which is recognised as one of the principal centres of diversity and endemism in Africa. Fynbos and Renosterveld are considered to be the main vegetation types in the CFR. Both vegetation types are very species rich, but have been transformed or degraded to a high degree and are therefore considered to be of high conservation value.

The site occurs within two vegetation types: i.e. Western Ruens Shale Renosterveld, classified as Critically Endangered, and Overberg Sandstone Fynbos, classified as Least Threatened (Mucina *et al*. 2005, Mucina & Rutherford 2006). The vegetation-type descriptions provide an indication that vegetation on site consists primarily of fynbos and renosterveld. There are, however, also strips of thicket along drainage lines in the areas of steeper topography and wetland vegetation within the remaining drainage lines. Despite high levels of transformation on site, there are a number of different habitat types that may provide suitable habitat for a variety of faunal species.

Red List animal species of the study area

All Red List vertebrates (mammals, birds, reptiles, amphibians) that have a geographical distribution that includes the study area are listed in Appendix 1. Based on geographical distribution and habitat requirements, there are a small number of species of conservation concern that were considered to have a possibility of occurring on site or making use of habitats available on site. These are the following (only threatened or near-threatened species are listed):

- Natal Long-fingered Bat (NT)
- Montane Marsh Frog (NT)
- Yellowbellied House Snake (NT)

The remaining species with a geographical range that includes the site were assessed as having a low chance of occurring in available habitats in the study area.

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 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.

Western Cape Nature Conservation Laws Amendment Act of 2000 (Act 3 of 2000)

In terms of Section 26 of this Act, "*No person shall without a permit hunt or be in possession of any endangered wild animal or the carcass of any such animal*". Schedule 2 of this Act provides a list of Protected Wild Animals.

DESCRIPTION OF INFRASTRUCTURE

Based on the outcomes of the scoping study and wind monitoring on site, a total of 16 turbines have been proposed for the site. Each turbine will have a relatively small footprint. There will be disturbance beyond this during the construction phase since a lay-down area is required for each turbine prior to raising the turbine to it's final position.

There is an existing Eskom power line crossing the sites. No new overhead power lines are therefore required for this project. Two new substations will be constructed adjacent to the existing overhead powerline, one for Klipheuwel and one for Dassiesfontein. The substations will be approximately 60 m x 85 m in extent. There are also internal cables for connecting turbines to one another and internal access roads to turbines. It is proposed that the internal access roads and the internal cables linking turbines will follow the same routes.

The position of the turbines, substations, internal underground cables and access roads in the study area are indicated in Figure 2 below.

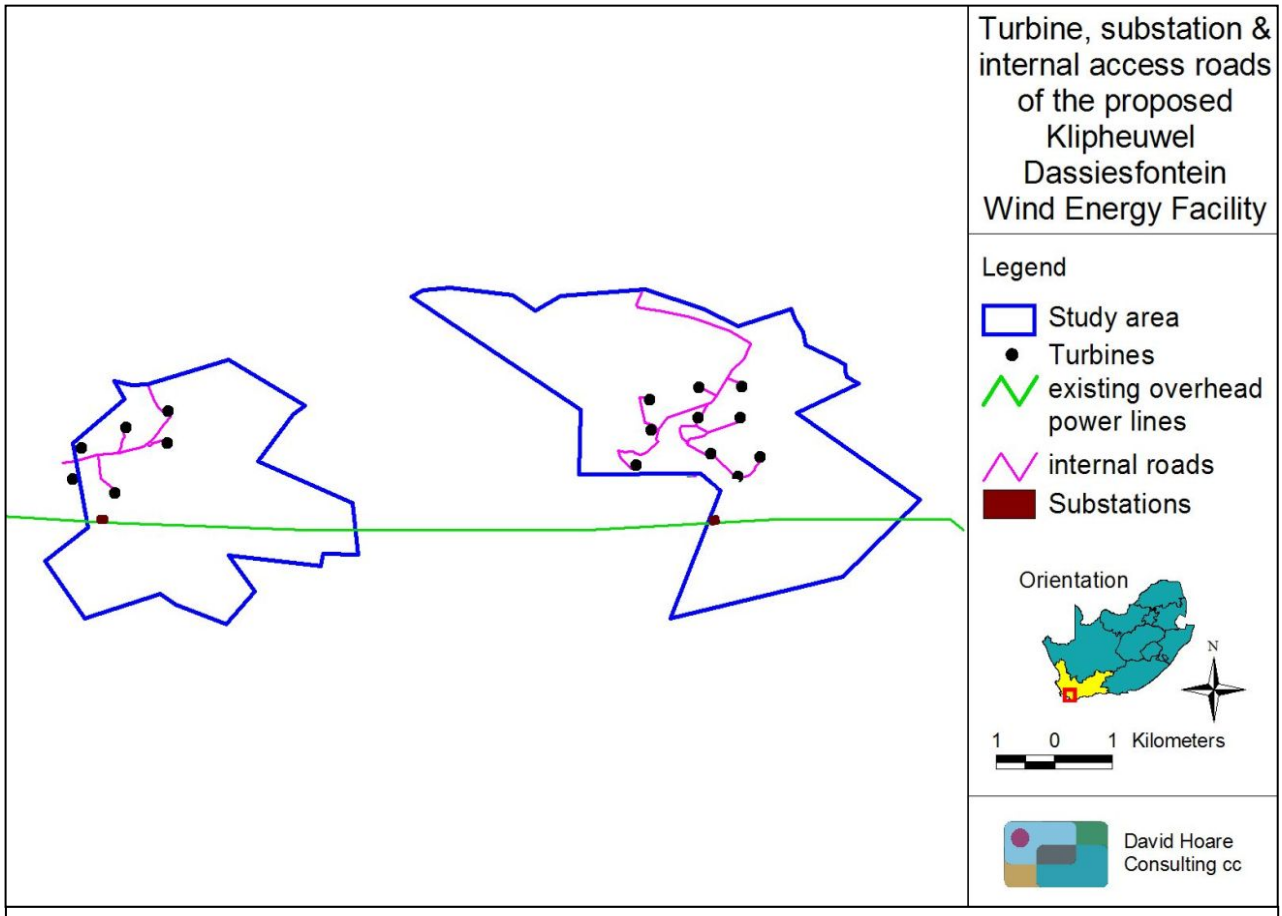

Figure 2: Infrastructure positions in relation to site boundaries.

IDENTIFICATION OF RISKS AND POTENTIAL IMPACTS

Potential issues related 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.
- 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 (i.e. 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 the WEF.

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.

Impact 1: Impacts on threatened 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. Construction of turbines, access roads, underground cables and other infrastructure associated with the wind energy facility will lead to direct loss of habitat. There are some small patches of natural habitat remaining on site. This vegetation potentially provides habitat for a small number of near threatened species (lower risk category than a threatened species), including the following: Yellow-bellied House Snake (NT) and Montane Marsh Frog (NT). The potential value of this natural habitat for these species of conservation concern is affected by the particular requirements of each species and the availability of habitat on site.

The Yellow-bellied House Snake is found in old termitaria and under stones or underground. It is most likely to occur in mountain fynbos in the study area. The remaining natural vegetation in the areas where infrastructure is proposed to be situated tends to be degraded and/or invaded by alien plants. None of the proposed infrastructure, except the Dassiesfontein substation, is within natural areas of moderate to good quality that is suitable for this species (Figure 3). No impacts are therefore anticipated on this species from any of the other infrastructure.

The Montane Marsh Frog is found in marshy areas, shallow seepage zones and shallow streams along rock outcrops in Mountain Fynbos and is found from 200 - 1800 m. Suitable

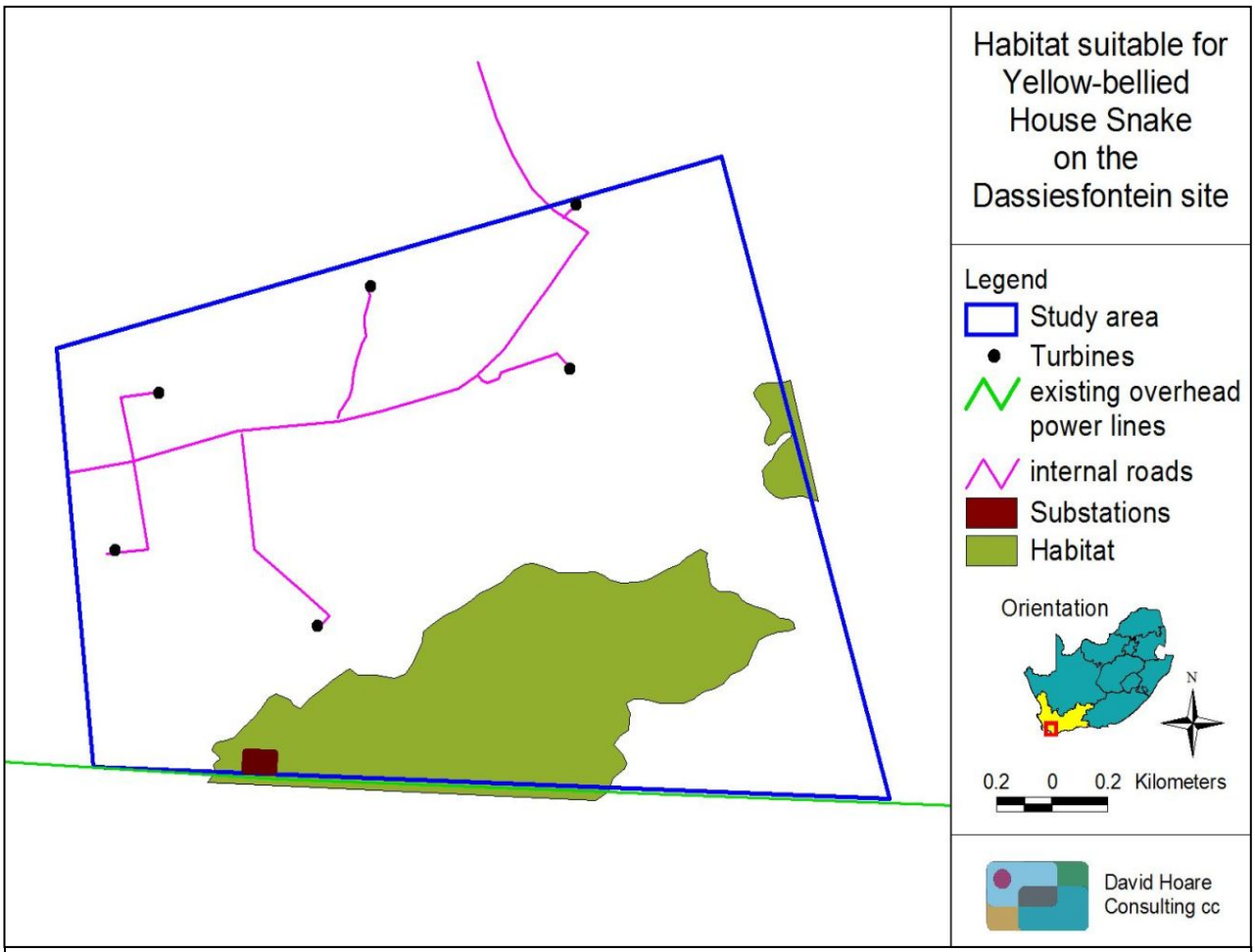

Figure 3: Possible areas where the Yellow-bellied House Snake could occur.

sites where it was thought possible that this species could occur are shown in Figure 4. None of the proposed infrastructure is within such areas. No impacts are therefore anticipated on this species.

Impact 2: Impacts on bats

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. In order to address this issue in South Africa, the Endangered Wildlife Trust (EWT) and BirdLife South Africa (BLSA) have combined efforts to lobby for the appropriate consideration of the potential negative effects of wind energy production.

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 to 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

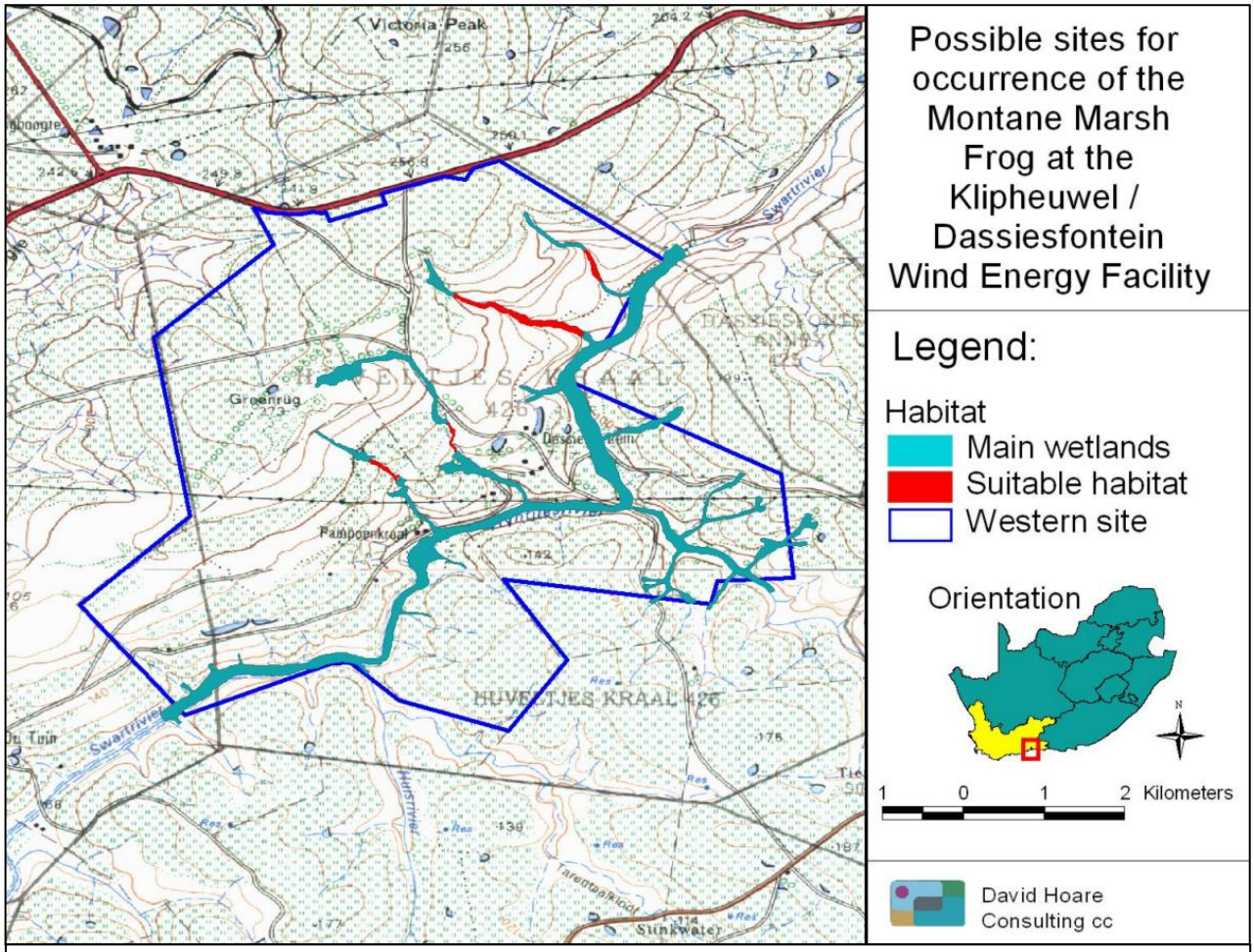

Figure 4: Possible sites where the Montane Marsh Frog could occur.

species a loss of individuals or localised 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:

- fragmentation of populations of affected species;
- reduction in area of occupancy of affected species; and
- 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. This is the Natal long-fingered bat (NT). It is unknown whether the species occurs on site or not, but this will be confirmed as part of a bat specialist study currently being undertaken on site. No known colonies exist near or on site, but it is still possible that the species could be affected by the proposed wind energy facility due to the fact that suitable roosting sites could exist within foraging distance of the site.

Impact 3: Impacts on watercourses and wetlands

Construction may lead to some direct or indirect loss of or damage to seasonal marsh

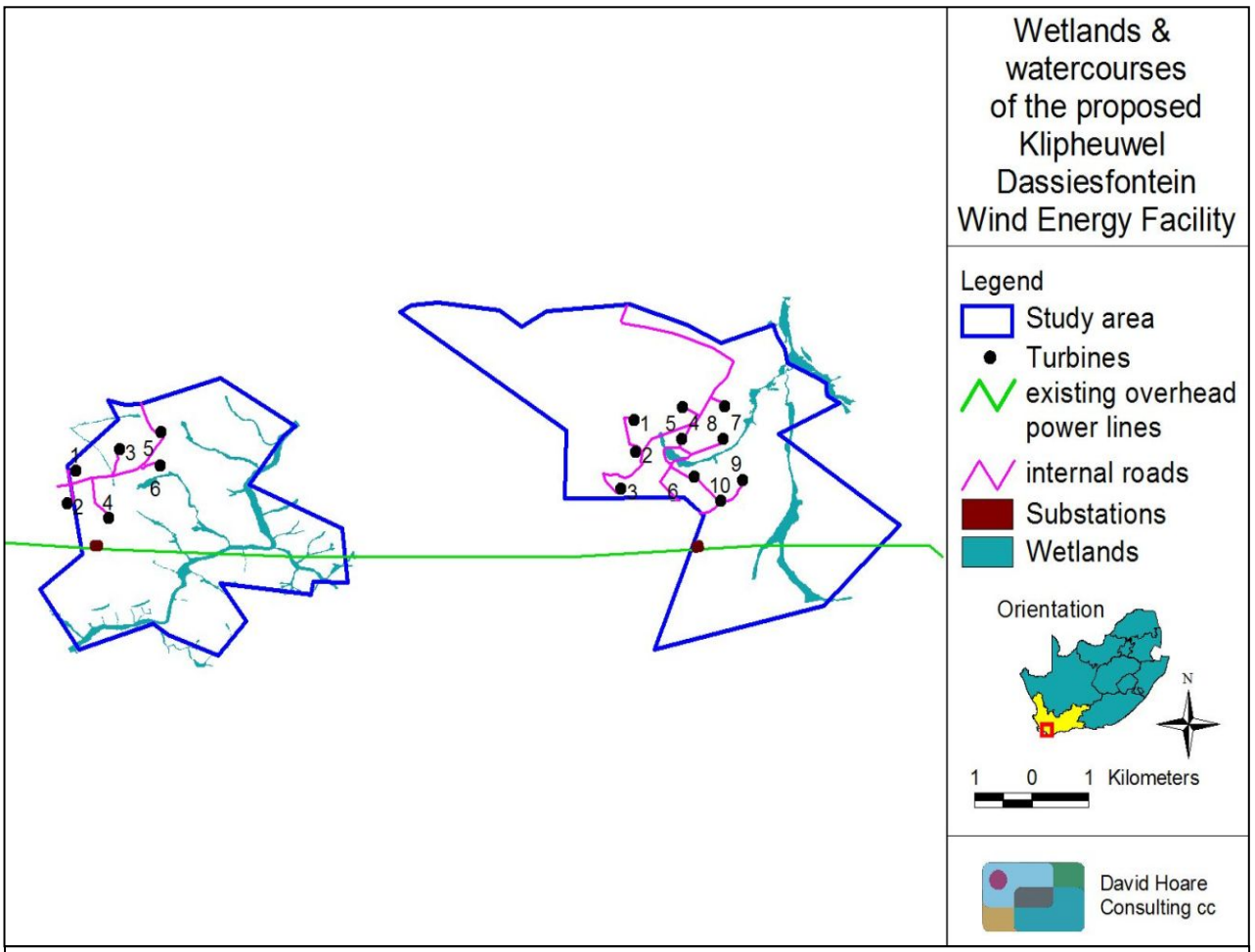

Figure 5: Watercourses and wetlands in the study area.

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 non-perennial streams, watercourses, drainage lines and/or wetlands. The position of these on site is shown in Figure 5. No proposed turbines or substations are within these areas, but some internal access roads cross mapped watercourse / wetland areas.

ASSESSMENT OF IMPACTS

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

- wind turbines;
- substations;
- underground cables between turbines and linking turbines to internal substations in combination with internal access roads.

Wind turbines

Impact 1: Impacts on threatened animals

No wind turbines occur within habitats suitable for species of conservation concern. The potential impact is therefore scored as zero.

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. This is 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.

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: If any populations of either species occurs in the area, the potential magnitude of the impact could be moderate.

Probability: No known populations of the bat species are known to 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: A monitoring programme is currently being implemented to document the effect on bats. This should provide a pre-construction benchmark against which to compare operational impacts. If the turbines are found to have a significant negative impact on bats then further measures will need to be implemented to control the impact, for example, halting operation during low wind conditions when bats are most active.

Nature: Impacts on individuals of threatened bat species		
	Without mitigation	**With mitigation**
Extent	regional (3)	regional (3)
Duration	long-term (4)	long-term (4)
Magnitude	medium (5)	Medium low (4)
Probability	improbable (2)	improbable (2)
Significance	**low (24)**	**low (22)**

Status (positive or negative)	negative	negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some degree	
Mitigation: (1) A monitoring programme should be implemented to document the effect of wind turbines on bat species.		
Cumulative impacts: Any other infrastructure could cause similar impacts.		
Residual Impacts: None.		

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

Impact 3: Impacts on watercourses

No wind turbines occur within watercourses and/or wetlands. The potential impact is therefore scored as zero.

Substations

Impact 1: Impacts on threatened animals

The Dassiesfontein substation is proposed to occur within degraded fynbos habitat, which is not likely to be potential habitat for the Yellowbellied House Snake. This species is most likely to be affected by the construction of the substation to a greater extent than the operation of the substation, although a small area of potential habitat will be permanently lost.

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

Duration: The impact will be of permanent duration because it leads to loss of habitat.

Magnitude: The scale of the impact is very small (one substation (on the Dassiesfontein site)). The habitat at this point is in poor condition. The potential magnitude of the impact could therefore be small.

Probability: Because of the fact that the substation is within degraded natural habitat, the probability of the impact occurring is improbable.

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

Mitigation measures: None proposed.

Nature: Impacts on individuals of threatened bat species		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	permanent (5)	permanent (5)
Magnitude	low (1)	low (1)
Probability	improbable (2)	improbable (2)
Significance	**low (14)**	**low (14)**
Status (positive or negative)	negative	negative
Reversibility	Not reversible	Not reversible

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Not applicable	
Mitigation: (1) None proposed.		
Cumulative impacts: Any other infrastructure could cause similar impacts.		
Residual Impacts: 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. This is Schreiber's long-fingered bat (NT). The substations will affect a very small area of potential foraging habitat and it is unlikely that the small structure will pose a major threat to any populations of bats.

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

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: If any populations of the species occurs in the area, the potential magnitude of the impact could be very low.

Probability: No known populations of the bat species are known to occur in the grid in which the site is located. The probability of the impact occurring is therefore relatively low. It is also very unlikely that the substations will have any effect on bats. The probability is therefore scored as highly improbable.

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

Mitigation measures: None required.

Nature: Impacts on individuals of threatened bat species		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	long-term (4)	long-term (4)
Magnitude	Very low (1)	very low (1)
Probability	Highly improbable (1)	Highly improbable (1)
Significance	**low (6)**	**low (6)**
Status (positive or negative)	negative	negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Not applicable	
Mitigation: (1) None required		
Cumulative impacts: No other impacts are likely to cause similar effects on bats.		
Residual Impacts:		

None.

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

Impact 3: Impacts on watercourses

No substations occur within watercourses and/or wetlands. The potential impact is therefore scored as zero.

Internal cables and access roads

Impact 1: Impacts on threatened animals

No internal access roads occur within habitats suitable for species of conservation concern. The potential impact is therefore scored as zero.

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. This is Schreiber's 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. This species is not likely to be affected by the construction or operation of underground cables or access roads, except for a small loss of habitat.

Extent: The impact will occur at the site of the proposed wind energy facility.

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: If any populations of the species occur in the area, the potential magnitude of the impact could be very low.

Probability: No known populations of the bat species are known to occur in the grid in which the site is located. The probability of the impact occurring is therefore relatively low. It is also very unlikely that the infrastructure will have any effect on bats. The probability is therefore scored as highly improbable.

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

Mitigation measures: None required.

Nature: Impacts on individuals of threatened bat species		
	Without mitigation	**With mitigation**
Extent	local (1)	local (1)
Duration	long-term (4)	long-term (4)
Magnitude	Very low (1)	very low (1)
Probability	Highly improbable (1)	Highly improbable (1)
Significance	**low (6)**	**low (6)**
Status (positive or negative)	negative	negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Not applicable	
Mitigation:		

(1) None required
Cumulative impacts: Any other infrastructure could cause similar impacts.
Residual Impacts: None.

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

Impact 3: Impacts on watercourses

No wetlands or watercourses will be affected by proposed underground cables and internal access roads on the Dassiesfontein site. On the Klipheuwel site there are two watercourses on site that could potentially be affected by the proposed construction of underground cables and internal access roads. Access to turbines and thus construction of roads will probably require disturbance to these watercourses. The first watercourse will be crossed by the main access road onto Dassiesfontein (Figure 6). This will, however, occur at the sites of an existing main road. It is therefore considered unlikely that additional impacts will occur in these areas. The second watercourse will be impacted at its uppermost point where the Klipheuwel turbines 5 and 6 are joined by an internal access road.

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

Figure 6: Main Klipheuwel access road showing existing wetland crossings.

Duration: The impact will be of long-term duration, because natural vegetation downstream of the impact will be affected.

Magnitude: The potential magnitude of the impact could be medium to low at a local scale, due to the fact that little natural vegetation remains. Downstream areas could, however, be affected.

Probability: According to the current position of the underground cables and internal access roads, it is probable that the impact will occur.

Mitigation measures: Stormwater and runoff water must be controlled and managed to avoid impacts on watercourses. The internal access road should be moved slightly to the north-east (blue line in Figure 7) to avoid the wetland. If not, a permit from DWA is required if there are expected to be any new impacts on any wetland or water resources.

Nature: Damage to wetland areas.		
	Without mitigation	**With mitigation**
Extent	local and surroundings (2)	local and surroundings (2)
Duration	Long-term (4)	Short-term (1)
Magnitude	Low (3)	Low (2)

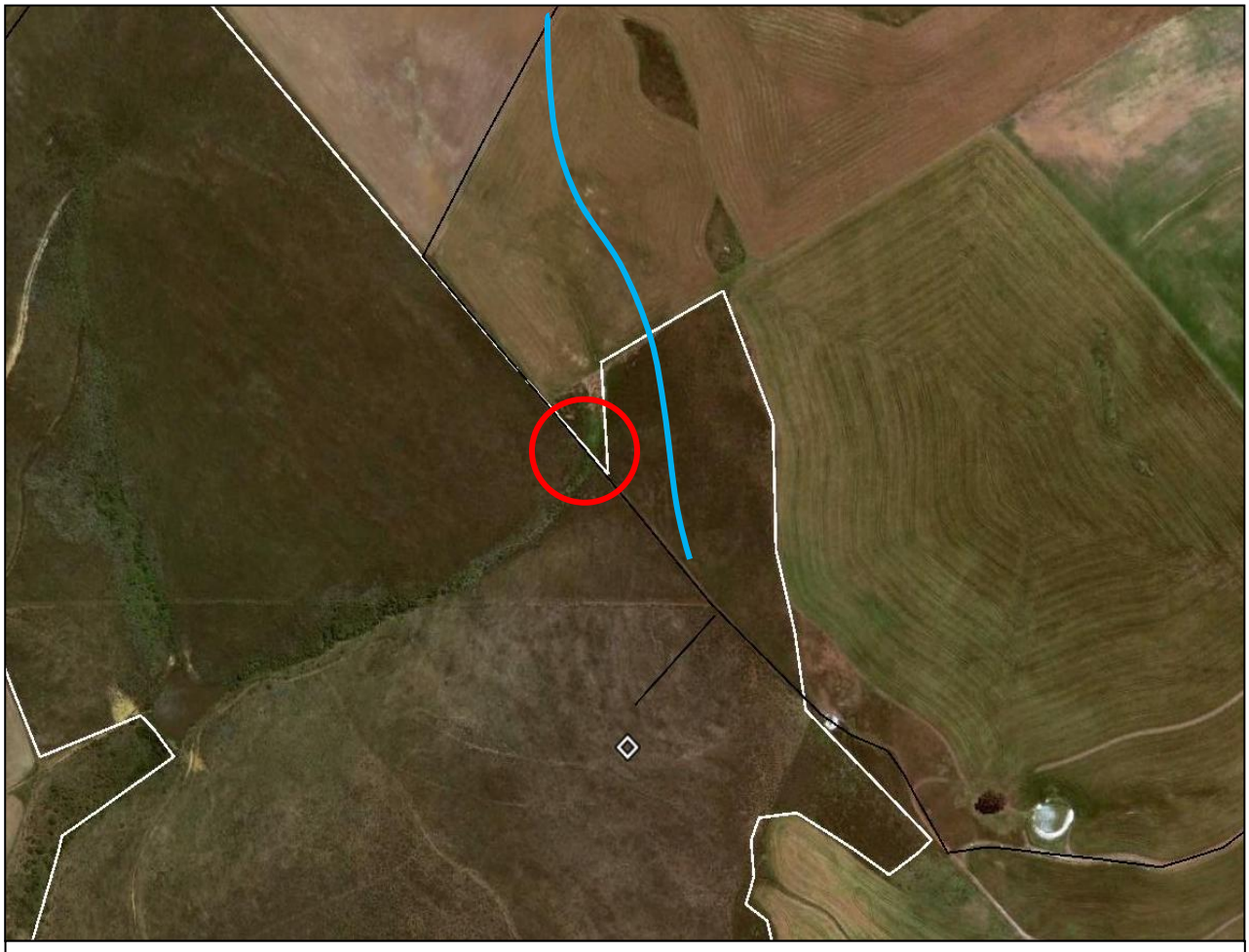

Figure 7: Wetland crossing between turbines 5 and 6.

Probability	probable (3)	improbable (2)
Significance	**low (27)**	**low (10)**
Status (positive or negative)	negative	negative
Reversibility	Reversible with effective rehabilitation	Reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: (1) Move internal access road slightly to the north-east, as indicated in Figure 7 OR obtain a permit from DWA to impact on any wetland or water resource.		
Cumulative impacts: None.		
Residual Impacts: 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

A large proportion of the study area is in a transformed state and consists primarily of agricultural lands. There are, however, areas of remaining natural vegetation as well as areas within cultivated lands that may provide habitat for threatened fauna.

A risk assessment was undertaken which identified two main potential negative impacts on fauna. The significance of impacts on birds will be assessed by a separate avifauna specialist study and are not addressed in this study.

There are a small number of species of conservation concern that may occur in habitats within the study area. There is one frog, one reptile and one mammal species of conservation concern that could potentially occur in the study area, i.e. the Montane Marsh Frog, the Yellowbellied House Snake and Schreiber's Long-fingered Bat, all classified as Near Threatened.

A risk assessment was undertaken which identified three main potential negative impacts on fauna, as follows:

- Impacts on habitats of non-flying threatened fauna;
- Impacts due to collision of bats with infrastructure (primarily turbine blades);
- Impacts of construction on wetlands / watercourses.

The Montane Marsh Frog is found in marshy areas, shallow seepage zones and shallow streams along rock outcrops in Mountain Fynbos, from 200 - 1800 m. It has not been previously recorded in the study area or surroundings, although atlas data is considered to be incomplete. Its known distribution ends 20 km to the west of the current site so there is some risk of it occurring on site. The only possible suitable habitat on site is within the drainage lines within natural areas in the western node of the site. Most of these drainage lines appear to be non-perennial, which would indicate a lower likelihood of this species occurring there. There are, however, a few sites where conditions could potentially be favourable for this species. A preliminary map of possible areas of where this species could occur is provided in Figure 3. Potential impacts on the Montane Marsh Frog are affected by the following factors:

- Potential habitats on site are probably already degraded due to cultivation of most of the site.
- The potential footprint of the proposed infrastructure is small compared to the total area of the site and excludes these wetlands.

Impacts on the Montane Marsh Frog are therefore not likely to occur.

The Yellow-bellied House Snake is found in old termitaria and under stones or underground. It is most likely to occur in mountain fynbos in the study area. None of the proposed infrastructure, except the Dassiesfontein substation, is within such areas. The site of the Dassiesfontein substation is within degraded natural vegetation and it is less likely that this species would be found there. No impacts are therefore anticipated on this species from any of the infrastructure. In addition, potential impacts on the Yellow-bellied House Snake are affected by the following factors:

- The potential footprint of the proposed infrastructure is small compared to the total area of the site and the total distribution of the species.

Impacts on the Yellow-bellied House Snake are therefore not likely to occur.

There is one near threatened (NT) flying mammal species considered to have some probability of occurring on site, i.e. Schreiber's Long-fingered Bat. The species requires caves or similar habitats for roosting. No populations are known to occur in the area, but there is a risk that migrating individuals may be impacted by operational turbines.

Impacts were assessed and it emerged that all potential impacts have low significance. 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.

Recommendations

The following recommendations are made to reduce impacts or provide additional information that can lead to reduction or control of impacts:

- A monitoring programme should be implemented to document the effect of the WEF operation on bats. This should take place before construction (to provide a benchmark), during construction and during operation. This will provide information to quantify the impacts of the present project.

Conclusions

The overall impacts of the proposed project have been assessed as 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 even lower significance. The proposed project is therefore considered to be acceptable in terms of potential impacts on fauna and wetlands / 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.

	Wind turbines		Substations		Internal cables & access roads	
Impacts on:	Without mitigation	With mitigation	Without mitigation	With mitigation	Without mitigation	With mitigation
1. threatened animals	zero (0)	zero (0)	low (14)	low (14)	zero (0)	zero (0)
2. bats	low (24)	low (22)	low (6)	low (6)	low (6)	low (6)
3. watercourses & wetlands	zero (0)	zero (0)	zero (0)	zero (0)	low (27)	low (10)

MANAGEMENT PLAN

Control measures are only proposed for those impacts where mitigation measures are proposed 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.

OBJECTIVE: Monitor impacts on bats due to turbine blade collisions	
Project component/s	Turbines
Potential Impact	Loss of individuals of the threatened bat species
Activity/risk source	Operation
Mitigation: Target/Objective	Target: low mortalities within project control area Time period: operation

Mitigation: Action/control	Responsibility	Timeframe
(1) establish an ongoing monitoring programme to detect and quantify any mortalities of individuals of threatened bat species	Management (environmental officer),	operation

Performance Indicator	Number of individuals killed by turbine blades within project area
Monitoring	• Determine densities of affected bat species within the area occupied by the wind energy facility before and after construction. • Document patterns of bat movement in the vicinity of the wind energy facility before and after construction. • Record bat mortalities and, as far as possible, the circumstances surrounding collisions. Standard protocols should be used when undertaking such surveys.

OBJECTIVE: Limit damage to watercourses / wetlands	
Project component/s	Any infrastructure or activity that will result in disturbance to watercourses
Potential Impact	Damage to wetland areas 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, operation
Mitigation: Target/Objective	Target: no damage to watercourses within project area Time period: construction, operation

Mitigation: Action/control	Responsibility	Timeframe
(1) align underground cables and internal access roads as much as possible along existing infrastructure. (2) internal access road at Klipheuwel (as shown in Figure 7) should be moved slightly to the north-east OR obtain a permit from DWA to impact on any wetland or water resource. (3) rehabilitate any disturbed areas as quickly as possible (4) control stormwater and runoff water (5) 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 (6)	Construction team, management, environmental control officer	Construction, operation

Performance Indicator	No impacts on wetland vegetation or natural status of watercourses
Monitoring	• Habitat loss in watercourses should be monitored before and after construction. • The environmental manager should be responsible for driving this process. • Single post-construction report is sufficient.

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

MAMMALS

Common name	Taxon	Habitat	Status[2]	Likelihood of occurrence[1]
Black rhinoceros	Diceros bicornis bicornis	Wide variety of habitats.	CR	**NONE**, only occurs in game reserves
White-tailed rat	Mystromus albicaudatus	Highveld and montane grassland, requires sandy soils with good cover. Found throughout South Africa except Northern Cape and Limpopo	EN	**LOW**, previously recorded in neighbouring grid, but substrate properties on site not considered to be suitable for this species
Bontebok	Damaliscus pygargus pygargus	Used to inhabit renosterveld. Now only in reserves.	VU	**NONE**, only occurs in game reserves
Natal long-fingered bat	Miniopterus natalensis	Fynbos, savanna, woodland. Caves and sub-terranean habitats.	NT	**HIGH**, previously recorded in two neighbouring grids. Large colony at De Hoop Guano Caves
Fynbos golden mole	Amblysomus corriae	Lowland fynbos and Knysna forest, also in urban areas. Prefers sandy soils with deep litter layer.	NT	**LOW**, recorded in neighbouring grid to the south, but substrate properties on site not considered to be suitable for this species.
Water rat	Dasymus incomtus	Semi-aquatic, occurring in various wetland types	NT	**LOW**, site just within distribution range, but no records in grid or neighbouring grids.

[1]Distribution according to Friedmann & Daly 2004.

[2]Status according to IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. (www.iucnredlist.org). Downloaded on 04 October 2010.

AMPHIBIANS

Common name	Species	Habitat	Status[2]	Likelihood of occurrence
Micro frog	Microbatrachella capensis	Found in undisturbed seasonal vleis in acid fynbos. Highly threatened by alteration of hydrological cycle and direct habitat transformation. Very sensitive to disturbance of habitat.	CR[1], CR[2]	**LOW**, found in qds just to south (3419AD and 3419AC), but is a coastal species occurring below 80 m a.s.l. and within 10 km of the coast.
Cape platanna	Xenopus gilli	Found in seepages in flat areas where fynbos occurs on acid sands. Highly threatened by alteration of hydrological cycle and direct habitat transformation.	EN[1], EN[2]	**LOW**, found in qds just to south (3419AD and 3419AC), but is a coastal species occurring below 140 m a.s.l. and within 10 km of the coast.
Western Leopard Toad	Bufo pantherinus	Mostly associated with sandy coastal lowlands	EN[1], EN[2]	**LOW**, previously found in qds just to south (3419AD), but substrate properties on site not considered to be suitable for this species
Giant / Cape rain frog	Breviceps gibbosus	Inhabits gently sloping well drained ground, where it burrows. Foothills of mountains and low isolated hills. Threatened by direct habitat	VU[1], NT[2]	**LOW**, found in qds 25 km to west of study area. Substrate and habitat properties on site are suitable for this species, but

Common name	Species	Habitat	Status[2]	Likelihood of occurrence
		destruction, such as intensive ploughing, but can be found in disturbed areas and is adaptable and fairly resilient to disturbance. Most localities where species is found have fine-grained, heavy substrates derived from shales or granites.		site is outside known distribution range.
Rose's mountain toadlet	Capensibufo rosei	Undisturbed montane fynbos. Inhabits seepage zones and shallow pools in fynbos on mountains above 500m a.s.l. Breeds in small shallow temporary pools, usually dominated by restios.	VU[1], VU[2]	**LOW,** previously recorded in 3419AA and 3419AD, but most likely to have been in mountainous areas to south of site (Babilonstoringberge).
Cape caco	Cacosternum capense	Occurs in flat, low-lying areas, in Renosterveld or cultivated lands formerly covered by this vegetation. Heavy, poorly drained clay and loamy soils. Spends most of the year buried underground, emerging in the wet winter to breed in shallow pools.	VU[1], VU[2]	**LOW**, Occurs west of 3419AA in the adjacent grid, Substrate and habitat properties on site are suitable for this species, but it has not previously been recorded this far east.
Montane marsh frog	Poyntonia paludicola	Marshy areas, shallow seepage zones and shallow streams along rock outcrops in Mountain Fynbos. Found from 200 - 1800 m.	NT[1], NT[2]	**MEDIUM**, previously recorded in qds to west of site, but atlas data considered to be incomplete.

[1]Status according to Minter et al. 2004 and [2]IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. (www.iucnredlist.org). Downloaded on 04 October 2010.

REPTILES

Common name	Species	Habitat	Status	Likelihood of occurrence
Geometric tortoise	Psammobates geometricus	Inhabits coastal Renosterveld in south-western Cape. Threatened by habitat destruction.	EN[1], EN[2]	**LOW**, only found in qds west and north-west of study area (3418BB).
Yellowbellied house snake	Lamprophis fuscus	Old termitaria and under stones, underground. Most likely to occur in mountain fynbos in study area, although secondary grassland may also be suitable habitat. Found throughout more mesic parts of South Africa (Cape, east coast, Highveld)	NT[1], NT[2]	**MEDIUM**, previously recorded in neighbouring grid (occurs in the grid to the north-west (3319CC)
Hawequa flat gecko	Afroedura hawequensis	Narrow cracks in sandstone boulders in shady conditions in the mountains of the south-western Cape. Mesic montane fynbos. No found near the coast.	NT[1], NT[2]	**LOW**, occurs in grids to north. Current site too low in elevation

[1]Status according to Groombridge 1994 and [2]IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. (www.iucnredlist.org). Downloaded on 04 October 2010..