PROPOSED ABERDEEN SOLAR FACILITY

FAUNA & FLORA SPECIALIST REPORT FOR BASIC ASSESSMENT

PRODUCED FOR SAVANNAH ENVIRONMENTAL

ON BEHALF OF

BIOTHERM ENERGY (PTY) LTD

BY

SIMON TODD CONSULTING

March 2012

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DECLARATION OF CONSULTANTS INDEPENDENCE

The author of this report, Simon Todd, does hereby declare that he is an independent consultant appointed by the Client 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 the specialist performing such work. All opinions expressed in this report are his own.

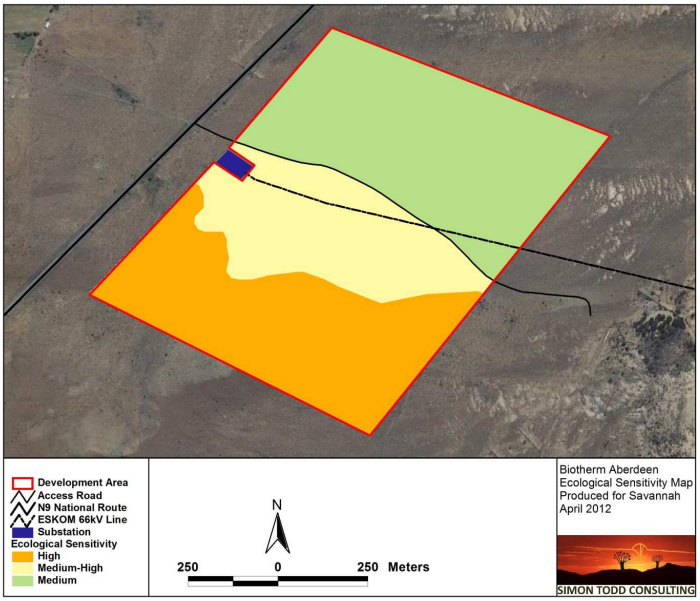
Simon Todd Pr.Sci.Nat

March 2012

EXECUTIVE SUMMARY

This report details the ecological (fauna and flora) impacts likely to be associated with the development of a solar PV/CPV facility of up to 20 MW on the farm Wildebeest Poorje 153 portion 1, located approximately 17 km southwest of Aberdeen along the N9 national road.

A site visit and desktop study were conducted to assess the presence and distribution of ecologically sensitive, species and habitats. A sensitivity map for the site was generated which is depicted below. The proposed development area encompasses 70 ha of which 28 ha was classified as Medium Sensitivity, 17 ha as Medium-High Sensitivity and 24 ha as High Sensitivity. The High Sensitivity area represents a rocky hill which characterizes the southern third of the site. Plant and animal diversity in this area is high, and it also contains a number of protected plant species. As a result, this area should not be developed. The adjacent plains are not deemed to be highly sensitive and are suitable for the development of the solar PV/CPV facility. There were no sensitive species or areas within the assessed Medium Sensitivity area that would need to be avoided, and given the low slope of the area, the ecological risks associated with the development of this area would be very low.



Five major risk factors associated with the development were identified. These are

- Disturbance and loss of vegetation and sensitive plant communities
- Increased risk of alien plant invasion
- Increased soil erosion risk
- Faunal habitat loss and disturbance
- Negative impacts on avifauna

Although all of the above impacts pose some risk, the majority can be managed and mitigated to a low level of impact. Some loss of vegetation and faunal habitat is unavoidable and cannot be mitigated. However, the site is adjacent to an ESKOM

substation as well as the N9 national road, which reduces the current value of the habitat at the site and lowers the extent of the potential impacts of the development. Provided that the development is restricted to the plains and the recommended mitigation measures are implemented, the development would not result in significant long-term degradation of the receiving environment.

Summary assessment of the pre- and post-mitigation impacts associated with the development of the proposed BioTherm Aberdeen Solar Energy Facility.

Impact	**Pre Mitigation**	**Post Mitigation**
Disturbance of sensitive plant communities	Medium	Low
Increased alien plant invasion risk	Moderate	Very Low
Increased erosion risk	Moderate	Very Low
Faunal habitat loss and disturbance	Moderate	Low
Negative impacts on avifauna	Low	Very Low

1 INTRODUCTION

BioTherm Energy (Pty) Ltd ("BioTherm") is proposing to develop a solar energy facility in the Eastern Cape Province, near Aberdeen. The development would have a maximum generation capacity of up to 20MW and would be less than 20 ha in extent. In terms of the EIA regulations, a Basic Assessment process is required before the development can proceed. Savannah Environmental has appointed Simon Todd Consulting to conduct a specialist fauna and flora assessment of the site as part of the Basic Assessment process.

The development would be situated on the farm Wildebeest Poorje 153 portion 1, located approximately 17 km southwest of Aberdeen along the N9. The site lies adjacent to the ESKOM Aberdeen 66kV substation. In order to achieve the desired 20 MW output, approximately 20 ha of space to install the solar panels would be required.

The broad terms of reference for the assessment include the following

- Assess and detail the potential impacts of the proposed development on both vegetation and fauna at the site
- Outline possible mitigation measures, rehabilitation procedures and or vegetation removal procedures that would reduce the potential impacts of the development.
- Identify and rate the significance of potential impacts and outline any additional management guidelines that might be required.

1.1 SCOPE OF STUDY

The scope of the study includes the following activities

- a description of the environment that may be affected by the activity and the manner in which the environ mint may be affected by the proposed project
- a description and evaluation of environmental issues and potential impacts (incl using direct, indirect and cumulative impacts) that have been identified
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- an indication of the methodology used in determining the significance of potential environmental impacts
- an assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria :
    - the nature of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected
    - the extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
    - the duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5- 15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent
    - the probability of the impact, describing the likelihood of the impact actually

occurring, indicated as improbable (low likelihood) probable (distinct possibility), highly probable (most likely), or definite (Impact will occur regardless of any preventable measures)
    - the severity/beneficial scale indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit) severe/beneficial (long-term impact that could be mitigated/long-term benefit) moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect
    - the significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high
    - the status which will be described as either positive, negative or neutral
    - the degree to which the impact can be reversed
    - the degree to which the impact may cause irreplaceable loss of resources
    - the degree to which the impact can be mitigated
- a description and comparative assessment of all alternatives recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr)
- an indication of the extent to which the issue could be addressed by the adoption of 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 identified alternatives

1.2 DATA SOURCING AND REVIEW

The data sources consulted and used where necessary in the study includes the following:

- Information on plant and animal species recorded for the Quarter Degree Squares (QDS) 3223DB and 3224CA was extracted from the SABIF/SIBIS database hosted by SANBI.
- Threatened Ecosystem data was extracted from the NEM:BA listed ecosystems layer (SANBI 2008).
- Critical Biodiversity Areas for the site were obtained from the Eastern Cape Biodiversity Conservation Plan (Berliner & Desment 2007)., which along with ancillary coverages was obtained from the SANBI BGIS website, http://bgis.sanbi.org/overberg/CBAs.asp.
- Vegetation types and their conservation status was extracted from the South African National Vegetation Map (Mucina and Rutherford 2006).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystems Protection Assessment, NFEPA (Nel et al. 2011).

- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- The above information was supplemented with faunal distribution maps available in the literature including Branch (1998) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friendmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.

1.3 SAMPLING LIMITATIONS AND ASSUMPTIONS

The major potential limitation associated with the sampling approach is the narrow temporal window of sampling. Ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. However, this is rarely possible due to time and cost constraints and therefore, the representivity of the species sampled at the time of the site visit should be critically evaluated.

Rainfall preceding the site visit had been very good with the result that the vegetation was in an excellent condition for sampling. The grasses present were in flower and could be identified as could the shrubs and forbs present. As a result of the good rainfall a number of geophytes species were also observed. This suggests that the results of the study in terms of vegetation are highly reliable and it is unlikely that many species were overlooked because they were dormant at the time of the site visit. Although a full plant species list was compiled for the site from the site visit, a list of endangered species which are known from other studies to occur in the general vicinity of the site was also generated. As only a single day was spent in the field, a large number of fauna were not observed during the site visit, but the lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach which takes account of the study limitations.

2 REGULATORY AND LEGISLATIVE OVERVIEW

A summary of the relevant portions of the Acts which govern the activities and potential impacts to the environment associated with the development are listed below. Provided that standard mitigation and impact avoidance measures are implemented, not all the activities listed in the Acts below would actually be triggered.

National Environmental Management Act (NEMA) (Act No 107, 1998):

NEMA requires that measures are taken that ”prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.” In addition:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied:

- That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

Environment Conservation Act (ECA) (No 73 of 1989 Amendment Notice No. R1183 of 1997)

This Act provides for the effective protection and controlled utilisation of the environment. This Act has been largely repealed by NEMA, but certain provisions remain, in particular provisions relating to environmental impact assessments.

National Environmental Management: Biodiversity Act (NEM:BA) (Act 10 of 2004):

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Draft National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No 32689, 6 November 2009) has been gazetted for public comment. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the NSBA 2004. In terms of the EIA regulations, a basic assessment report is required for the transformation or removal of indigenous vegetation in a critically endangered or endangered ecosystem regardless of the extent of transformation that will occur. However, all of the vegetation types within and surrounding the study site are classified as Least Threatened.

NEM:BA also deals with endangered, threatened and otherwise controlled species, under the TOPS Regulations (Threatened or Protected Species Regulations). The Act provides for listing of species as threatened or protected, under one of the following categories:

- **Critically Endangered:** any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered:** any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- **Vulnerable:** any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species:** any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as Restricted Activities, are regulated by a set of permit regulations published under the Act. These activities may not proceed without environmental authorization. Those relevant to the current study are listed below.

Under the **Environmental Impact Assessment Regulations Listing Notice 1 of 2010** (No. R.544) the following activities are likely to be triggered:

> *Activity 1:* The construction of facilities or infrastructure for the generation of electricity where:
>
> i. the electricity output is more than 10 megawatts but less than 20 megawatts;

And, under **Environmental Impact Assessment Regulations Listing Notice 3** of 2010 (*R.546):*

Activity 14. The clearing of an area of 5 hectares or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation.

It is important to note that the above thresholds and activities also apply to phased developments *"where any phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold."*

National Forests Act (No. 84 of 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: *"no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated".*

The only protected tree species observed within the development footprint was *Boscia albitrunca*, a number of individuals of which occurred on the rocky hill which forms the southern extent of the site.

Conservation of Agricultural Resources Act (Act 43 of 1983):

The Conservation of Agricultural Resources Act provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 plants includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodline of water courses and wetlands.

The abundance of alien plant species at the site was very low, which can be ascribed firstly to the aridity of the site as well as the low rainfall in the period preceding the site visit.

Eastern Cape Nature Conservation Act, 19 of 1974 and variously amended thereafter

The above act as well as the Transkei Decree (No 9 Of 1992) and the Ciskei Nature Conservation Act of 1987 are all applicable to the Eastern Cape. These acts make provision for the management of protected areas, as well as for regulations relating to the hunting of wild animals, catching of fish and the harvesting of plant species. Lists of protected plant and animal species are provided. Protected species include all frogs, tortoises and reptiles.

3 METHODOLOGY

3.1 SITE VISIT

The site visit took place on the 14th of April 2012. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present at the site were identified and mapped in the field. Walk-through-surveys were conducted across the site and all plant and animal species observed were recorded. Searches for listed and protected plant species at the site were conducted and the locations of all listed plant species observed were recorded using a GPS. Active searches for reptiles and amphibians were also conducted within habitats likely to harbor or be important for such species. The presence of sensitive habitats such as wetlands or pans and unique edaphic environments such as rocky outcrops or quartz patches were noted in the field if present and recorded on a GPS and mapped onto satellite imagery of the site.

3.2 SPECIES LISTS

Following the site visit and the identification of the different ecological features of the site, lists of mammals, reptiles and amphibians which were observed at the site were augmented with species likely to occur at the site based on distribution records from the literature and various spatial databases (SANBI's SIBIS and BGIS databases). Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals. The lists provided are based on species which are known to occur in the broad geographical area as well as an assessment of the availability and quality of suitable habitat at the site. For each species, the likelihood that it occurs at the site was rated according to the following scale:

Low: The available habitat does not appear to be suitable for the species and it is unlikely that the species occurs at the site.
Medium: The habitat is broadly suitable or marginal and the species may occur at the site.
High: There is an abundance of suitable habitat at the site and it is highly probable that the species occurs there.
Definite: Species that were directly or indirectly (scat, characteristic diggings, burrows etc) observed at the site.

The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria version 3.1 (2012) and where species have not been assessed under these criteria, the CITES status is reported where possible. These lists are adequate for mammals and amphibians, the majority of which have been assessed, however the majority of reptiles have not been assessed and therefore, it is not adequate to assess the potential impact of the development on reptiles, based on those with a listed conservation status alone. In order to address this shortcoming the distribution of reptiles was also taken into account such that any narrow endemics or species with highly specialized habitat requirements occurring at the site were noted.

Table 1. The IUCN Red List Categories for fauna and flora. Species which fall within the categories in red and orange below, are of conservation concern.

IUCN Red List Category
Critically Endangered (CR)
Endangered (EN)
Vulnerable (VU)
Near Threatened (NT)
Critically Rare
Rare
Declining
Data Deficient - Insufficient Information (DDD)
Data Deficient - Taxonomically Problematic (DDT)
Least Concern

3.3 SENSITIVITY MAPPING & ASSESSMENT

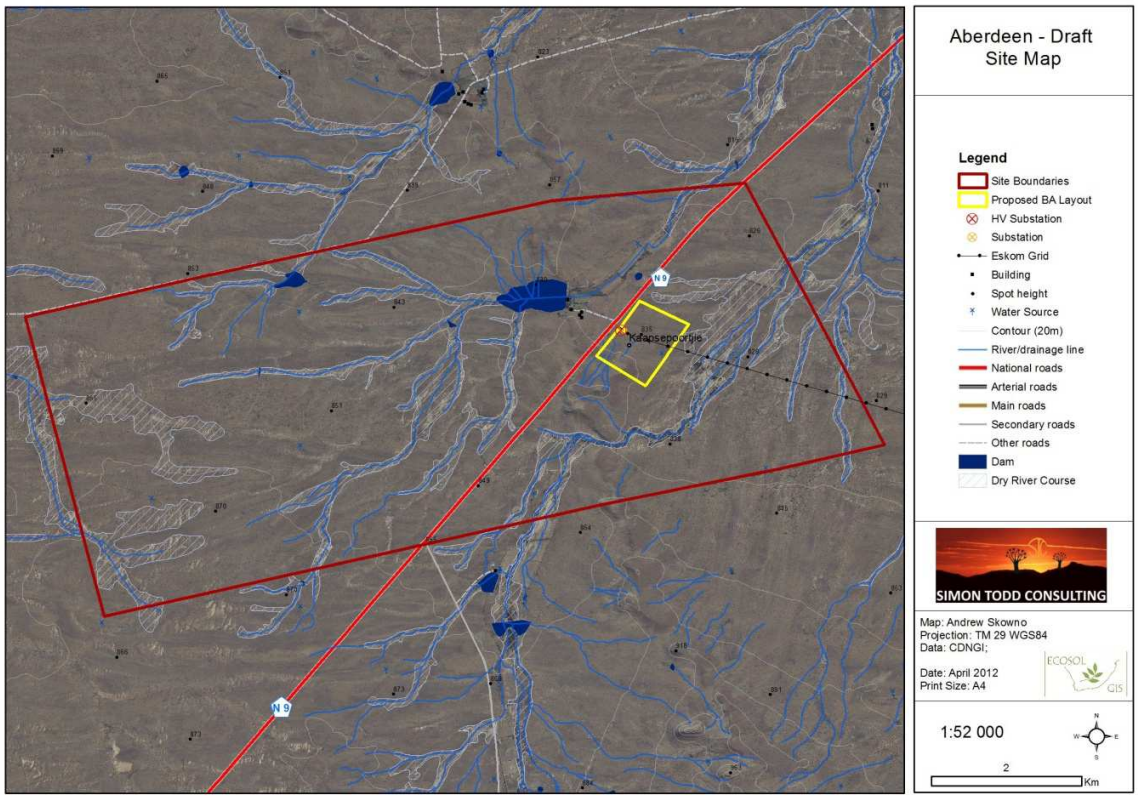
An ecological sensitivity map of the site was produced by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases as described above. This includes delineating the different vegetation and habitat units identified in the field and assigning sensitivity values to the units based on their ecological properties, values and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within these areas with little ecological impact.

- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is highly undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided at all costs.

3.4 RELEVANT ASPECTS OF THE DEVELOPMENT

Although a single site is being considered, the site is larger than required for the development and as a result there is scope within the preferred development area for adjusting the final development footprint to account for ecologically sensitive areas which may occur.



Figure
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4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford 2006), the site lies within the Eastern Lower Karoo vegetation type. Eastern Lower Karoo occupies 8321 km^2 of the plains and low hills of the southern Nama Karoo, from between Beaufort West and Aberdeen in the west to Pearston in the east. From north to south it is bounded by the mountains of the escarpment to the north and mountains and valleys of the Sundays River and Baviaans mountains. The vegetation type is listed as Least Threatened and less than 2% has been transformed. It is however poorly conserved as less than 1% of a target of 16% falls within formally protected areas. Other vegetation types which occur in the vicinity of the site include Southern Karoo Riviere which characterises the drainage lines and rivers of the area and Camdebo Escarpment Thicket which occurs on mountain slopes and hillsides from Aberdeen to Graaff Reinet and Pearston.

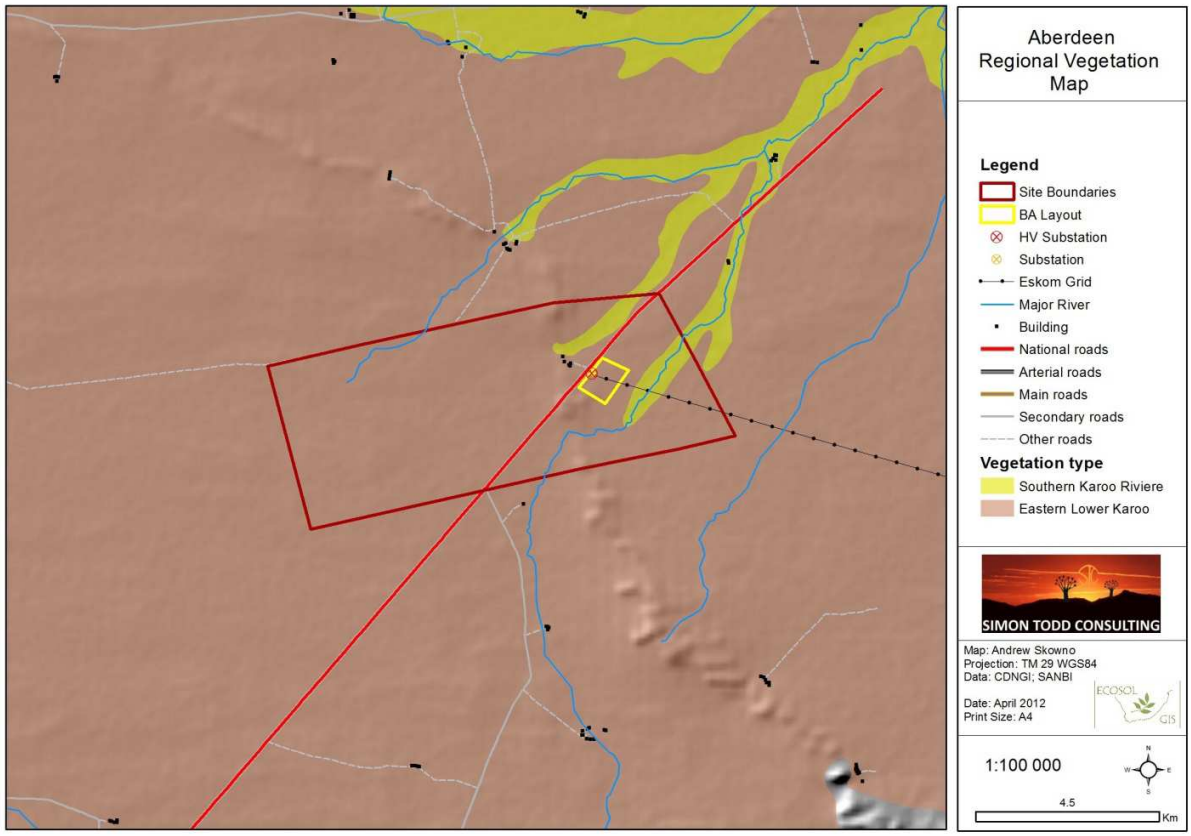

Figure 2. The broad-scale vegetation in and around the proposed BioTherm Aberdeen Solar Facility. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006).

4.2 FINE-SCALE VEGETATION PATTERNS

Despite that fact that the site has been mapped as falling within a single vegetation unit, several different habitats and plant communities were evident. These different plant communities were associated with the different substrates present at the site. Three different plant communities were identified:

- The vegetation of the rocky hill which forms the south-western extent of the site;
- The vegetation of the flat open plains which characterize the northern extent of the site
- A transitional vegetation type which occurs between the above two units.

During the site visit 118 species were observed at the site, which is a relatively high total given the limited extent of the study site and the arid nature of the area. The rocky slopes southeast of the substation and access road contained greater species richness than the plains to the north of the access road. Typical and dominant species of the rocky slopes include shrubs such as *Rhigozum obovatum*, *Felicia filifolia*, *Phymaspermum parvifolium* and *Euryops anthemoides* and grasses such as *Aristida congesta*, *Aristida diffusa* and *Digitaria eriantha*. The vegetation of the rocky hill contained a greater proportion of taller shrubs and small trees such as *Boscia albitrunca*, *Carissa bispinosa*, *Diospyros glabra* and *Rhus longispina*. This vegetation type also contained a number of geophytes such as *Haemanthus albiflos*, *Whiteheadia bifolia*, and *Tritonia laxifolia* as well as succulents such as *Pleiospilos bolusii* and *Astroloba congesta*. Overall, this is considered to be a sensitive vegetation type on account of the higher slope of the area as well as the higher plant diversity and presence of several listed plant species. The lower slopes of the hill contained course soils and gravel and represent a transitional area between the rocky slope and the plain which is characterized by silty clay soils. As this area also contained some protected plant species and was quite steep and vulnerable to erosion, it is also considered a somewhat sensitive habitat. Although there was some very minor drainage coming off the hill, these formed small channels cut into the gravel and specific vegetation had not developed around them.

The rocky outcrop at the site contains a number of protected plant species such as *Pleiospilos bolusii*, pictured here.

The vegetation of the open plains is dominated by typical karoo shrubs and grasses such as *Pentzia incana*, *Rosenia glandulosa*, *Felicia muricata*, *Lycium cinereum*, *Eragrostis lehmanniana*, *Aristida adscensionis*. Scattered trees and large shrubs such as *Acacia karoo*, *Rhus longispina* and *Lycium oxycarpum* also occur. The only protected species observed on the plains was a single colony of *Aloe claviflora*, which was outside the proposed development footprint. Given the ubiquitous nature of the species which characterize this area, as well as the open and flat nature of the plain, this vegetation type is considered the least sensitive and it is recommended that the development should be restricted to this area.

According to the SANBI SIBIS database, only one endangered species *Asparagus stipulaceus* is known from the area. The validity and presence of *Asparagus stipulaceus* at the site is however doubtful and probably results from taxonomic changes, since according to the Threatened Species Programme, Red List of South African Plants, it is known only from 12 locations along the coast between the Cape Peninsula and Witsand near Bredasdorp. The localities recorded from the area date from 1948 and are a historical artefact. No species which resemble *Asparagus stipulaceus* were observed at the site. A number of protected species were observed at the site, this includes *Aloe claviflora*, *Boscia albitrunca Haemanthus albiflos* and *Pleiospilos bolusii*.

The site was relatively free of alien species and there were no serious problems with aliens, although a number of alien species were present such as *Nicotiana glauca*, *Argemone mexicana*, *Malva parviflora* and *Salsola kali*. The presence of these species at the site indicates that the disturbance associated with the development of the site would be likely to encourage the invasion of the cleared areas by some of these species.

Figure 3. Looking out over the BioTherm Aberdeen Site from the rocky hill which forms the southern extent of the site. The vegetation of the foreground, associated with the hill is considered sensitive while the vegetation of the plain is not considered sensitive and is suitable for the construction of the PV/CPV facility.

4.3 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

The site lies within the planning domain of the Eastern Cape Biodiversity Conservation Plan (Berliner & Desment 2007). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to maintain ecosystem functioning and meet national biodiversity objectives. The site does not lie within a CBA and there are no CBAs within the site. There are however a number of aquatic CBAs associated with pans in the area as well as several larger terrestrial CBAs. This suggests that the site itself is probably not highly significant from a biodiversity maintenance perspective, but that the broader area is potentially important for the maintenance of biodiversity and broad-scale ecosystem function. The development is small in extent when considered in context of the broader landscape and the proximity of the development to existing substation and light of the overwhelmingly intact nature of the surrounding landscape. Furthermore, the proximity of the development to the existing ESKOM

substation and the N9 are also mitigating circumstances that reduce the potential impact of the development on the connectivity of the landscape.

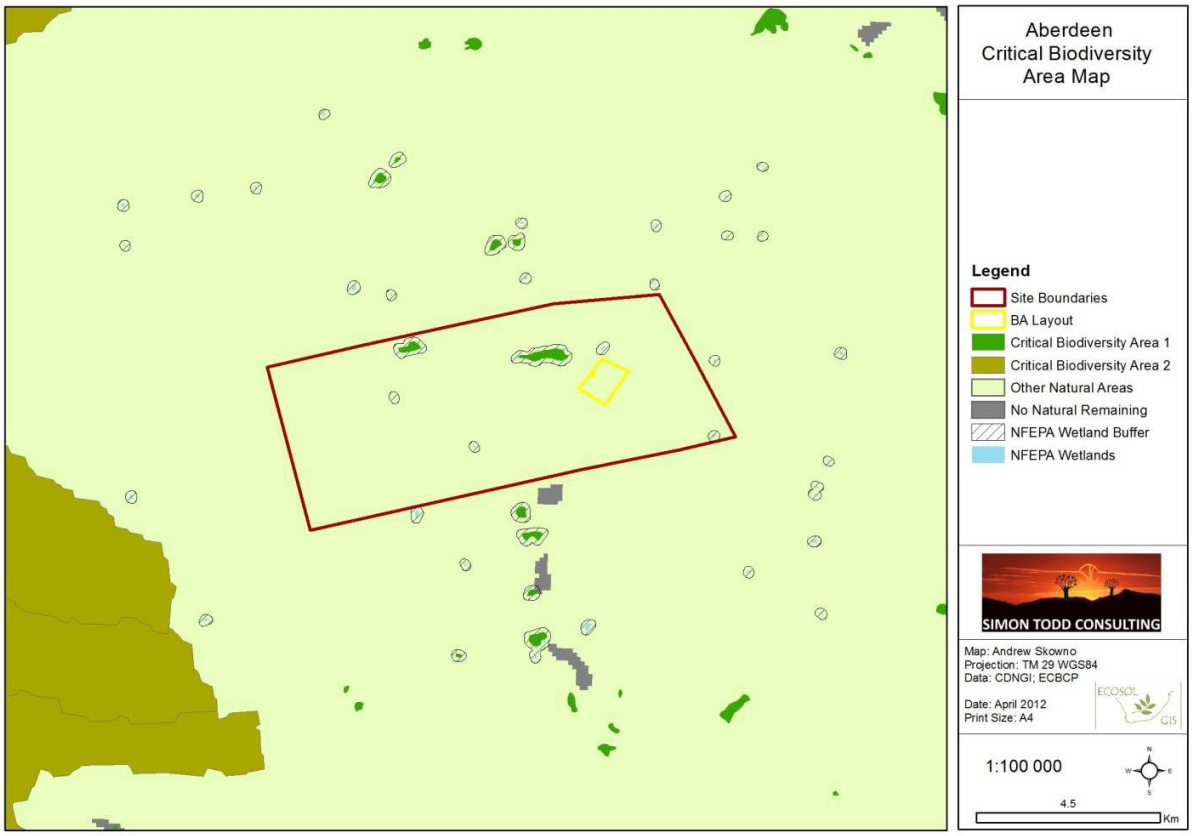

Figure 4. Critical Biodiversity Areas map of the BioTherm Aberdeen site and surrounding area. Although there are some aquatic CBAs associated with pans within the farm boundaries, there are no CBAs within the proposed development area.

4.4 FAUNAL COMMUNITIES

Mammals

The site falls within the distribution range of 44 terrestrial mammals, indicating that the mammalian diversity at the site is likely to be of moderate to high diversity. Of the species which are known to occur in the area, only the Honey Badger *Mellivora capensis* (Endangered) and Leopard *Panthera pardus* (Near Threatened) are listed. It is unlikely that the Leopard occurs within the site given the open nature of the habitat and agricultural activity that takes place in the area. Although it is possible that the Honey Badger occurs at the site, the development is not likely to have a significant impact on the local population of this species as they are wide-ranging and the extent of the development is small, and would not amount to a significant amount of habitat loss for this species.

The erection of fencing which prevents the movement of animals is a potential concern regarding the development of the site. However, the site occurs in close proximity to the

N9 road, which is already fenced on either side by restrictive mesh fencing. The fencing of the site is therefore not likely to contribute significantly to a reduction the connectivity of the landscape. The site is small in extent and there do not appear to be any reasons to expect that the area is an important faunal movement corridor of any sort.

Reptiles

The site lies in or near the distribution range of at least 39 reptile species (Appendix 3), indicating that the reptile diversity at the site is likely to be of moderate to low diversity. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 3 tortoises, 13 snakes, 14 lizards and skinks, one chameleon and 8 geckos. Species observed at the site include Burchells' Sand Lizard Pedioplanis burchelli and the Spotted Skaapsteker *Psammophylax rhombeatus*, both of which are likely to be widespread at the site. In terms of reptile habitats at the site, the rocky hill is likely to be of greater significance for reptiles as it contains a wider array of habitats and shelter for species which require rock cervices.

No listed reptile species are known from the area and given the small extent of the development, the impact on reptiles is likely to local in extent and of a generally low significance. The increased habitat structure that the panels and their support structures would create is likely to attract certain reptiles such as geckos and agamas. The change in vegetation cover and composition beneath the arrays and the shading of the soil would probably also create a novel environment beneath the panels that would result in a shift in reptile composition and abundance. These changes are not deemed positive as there is no evidence to suggest that any species of conservation concern might benefit.

Amphibians

The site lies within the distribution range of six amphibian species. Potential breeding habitats observed in and near the site include a small dam on the slopes of the rocky hill as well as a shallow artificial pan along the N9. The dam did not appear to hold sufficient water to be important as a breeding habitat as it was empty at the time of the site visit, while the pan contained a large amount of water, suggesting that it is potentially important. The pan is however outside the proposed development footprint and would not be directly impacted by the development. The only species of conservation concern which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. The site is however at the margin of the species' distribution and it is not likely that it occurs at the site as the habitat was not broadly suitable. As there is little specialized amphibian habitat at the site, impacts on amphibians are likely to be low magnitude. The greatest risk associated with the development in terms of amphibians is pollution spills which may occur during the construction phase and which could affect amphibians in adjacent areas.

Avifauna

According to the bird data sets which are available on the SANBI SIBIS data portal which includes the SABAP 1 and SAFRING data sets, 159 bird species are known from the broad

area surrounding the BioTherm Aberdeen site. The area has however been poorly sampled and the list probably does not include many species which are occasional visitors to the area. Of the recorded species, six are listed as Vulnerable or Near Threatened. These are listed in Table 1 below. All of the listed species are to some extent vulnerable to electrocution or collisions with transmission lines.

Table 1. Listed bird species known to occur in the vicinity of the proposed BioTherm Aberdeen Solar Facility, according to the SABAP 1 and 2 databases. The susceptibility of the different species to collision and electrocution from transmission infrastructure is also provided.

Scientific Name	Common Name	IUCN Status	Susceptibility	
			Collision	Electrocution
Falco biarmicus	Lanner Falcon	NT	High	Moderate
Anthropoides paradiseus	Blue Crane	VU	High	
Ardeotis kori	Kori Bustard	VU	High	
Neotis ludwigii	Ludwig's Bustard	VU	High	
Sagittarius serpentarius	Secretary Bird	NT	High	
Polemaetus bellicosus	Martial Eagle	VU	High	High

Although power lines pose a high risk to the listed species which occur in the area, the site is immediately adjacent to the substation and the length of any new power lines that would be required would be very short. Therefore the actual impact is likely to be low, and if appropriate mitigation measures are implemented, the impact would be restricted to a small loss of habitat. Mitigation measures would involve fitting bird flappers to any new transmission lines as well as insulating and protecting the live components from contact with birds. The proximity of the site to both the substation and the national road, decreases the current value of the site as bird habitat and also reduces the potential contribution of the development to habitat loss for birds.

Site Sensitivity Assessment

The ecological sensitivity map of the BioTherm Aberdeen Solar Facility is depicted below in Figure 5. The plains of the site are classified as Medium Sensitivity, while the rocky hill and slope are classified as High and Medium-High Sensitivity respectively. Given the high plant diversity of the rocky hill and the presence of a number of listed plant species in this area, it is recommended that the rocky hill is avoided by the development. The extent of the Medium sensitivity area is 28 ha which should be sufficient to accommodate the development. Given the low slope and homogenous nature of this area, development could proceed within this area with little ecological risk and there were no features present within this area that would need to be avoided.

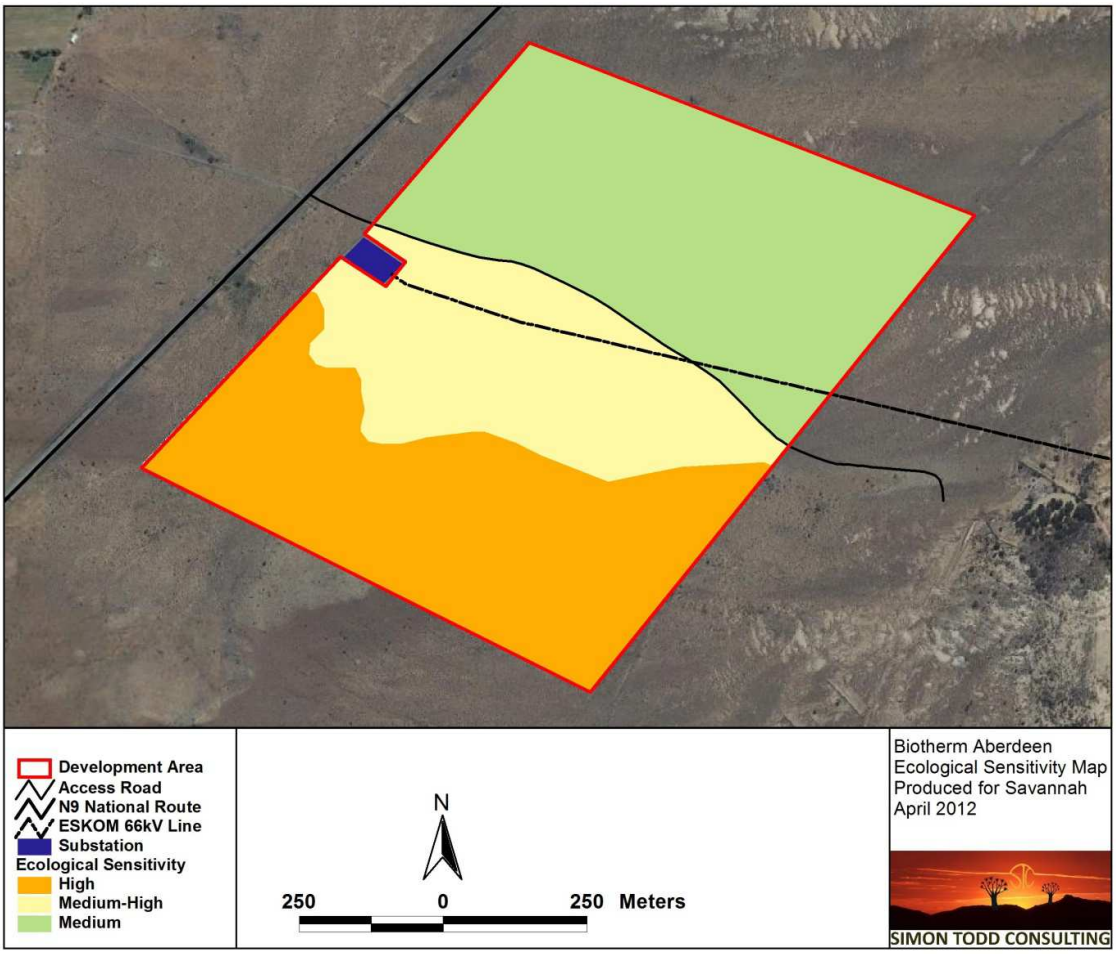

Figure 5. Ecological Sensitivity map of the proposed BioTherm Aberdeen Solar Facility site. Those areas classified as Medium Sensitivity are preferable for the location of the facility.

5 IMPACT ASSESSMENT

5.1 ASSESSMENT & SIGNIFICANCE CRITERIA

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

- The **nature** which shall include a description of what causes the effect what will be affected and how it will be affected.
- The **extent** wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):

- The **duration** wherein it will be indicated whether:

    - the lifetime of the impact will be of a very short du ration (0- 1 years) - assigned a score of 1.
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2.
    - medium-term (5-15 years) - assigned a score of 3
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5

- The **magnitude** quantified on a scale from 0-10 where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way 8 is high (processes are altered to the extent that they temporarily cease) and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

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

The **significance** which shall be determined through a syntheses of the characteristics described above and can be assessed as low, medium or high;
and;
the status, which will be described as either positive, negative or neutral.
the degree to which the impact can be reversed.
the degree to which the impact may cause irreplaceable loss of resources.
the degree to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:
S = (E + D + M)P
Where

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

The significance weightings for each potential impact are as follows:

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

process to develop in the area).

5.2 IDENTIFICATION & NATURE OF IMPACTS

The primary impacts on the terrestrial environment usually associated with the development of solar energy facilities, are as follows:

- **Loss of plant cover** as a result of vegetation clearing for roads, panel support structures and the other infrastructure of the development. This may impact sensitive plant communities, endangered or protected plant species or result in habitat loss for sensitive fauna.

- Increased **risk of alien plant invasion** resulting from the high levels of disturbance during construction as well as potentially from maintenance activities during the construction phase.

- Increased **erosion risk** as a result of soil disturbance and loss of plant cover, which is particularly a risk on steeper slopes and within areas which receive or channel runoff.

- Increased levels of **noise, pollution, disturbance** and human presence will be detrimental to fauna. Shy mammals would move away from the area particularly during the construction phase as a result of the noise and human activities present. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

- Direct and indirect **impacts of the development on avifauna** would result from habitat loss as well as electrocution and collisions with transmission lines, which is a particular problem for many larger birds such as eagles, flamingos, cranes and bustards.

The extent and significance of each of the above impacts can however vary substantially depending on the nature of the receiving environment and the location of the infrastructure of the development in relation to the sensitive receptors. Furthermore, some risks are relatively easily mitigated, while others, such as the loss of plant cover are an inevitable consequence of the development and can be considered more or less permanent. Each of the above impacts is assessed in relation to the BioTherm Aberdeen site and the likely extent of the development in the following section.

5.3 ASSESSMENT OF IMPACTS

The five major impacts identified above are assessed below according to the different criteria as described above.

Impact Nature: Loss and disturbance of vegetation and sensitive plant communities due to road and PV array construction activities.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Low (21)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Yes	
Can impacts be mitigated?	Yes	
Mitigation	• Vegetation clearing to be kept to a minimum. If possible the ground grass layer should be left intact and only the larger woody plants cleared. • All areas to be cleared should be clearly demarcated. • Sensitive areas as demarcated on the sensitivity map should be avoided, and where such areas occur within or near the development area, they should be clearly demarcated as no-go areas. • Sensitive areas with appropriate buffers at the site such as the washes should be demarcated at the site by an ecologist as part of the preconstruction activities for the site.	
Cumulative Impacts	No other known developments nearby so the potential for cumulative impacts appears to be low	
Residual Impacts	Some loss of vegetation and habitat is inevitable	

Impact Nature: Increased alien plant invasion risk, resulting from construction-phase disturbance as well as operational phase maintenance activities		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Short-term (1)
Magnitude	Medium (3)	Low (2)
Probability	Highly Probable (4)	Improbable (2)

Significance	Medium (32)	Very Low (8)
Status	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	Yes	
Can impacts be mitigated?	Yes	
Mitigation	• Soil disturbance and vegetation clearing should be kept to minimum. • Cleared areas that are not going to be used should be re-vegetated with locally-collected seed of indigenous species. • Regular monitoring to ensure that alien plants are not increasing as a result of the disturbance that has taken place. • All alien plants present at the site should be controlled annually using the best practice methods for the species present. • Bare soil should be kept to a minimum, and at least some grass or low shrub cover should be encouraged under the panels.	
Cumulative Impacts	A high density of alien species at the site would contribute to maintaining a high alien propagule pressure on the surrounding landscape.	
Residual Impacts	If alien species are regularly controlled residual impacts would be minimized.	

Impact Nature: Increased erosion risk as a result of soil disturbance and loss of vegetation cover.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Short-term (1)
Magnitude	Medium (4)	Low (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (40)	Very Low (8)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated?	Yes	
Mitigation	• Wherever possible, roads and tracks should be constructed so as to run along the contour. • All roads and tracks running down the slope must have water diversion structures present. • Any extensive cleared areas that are no longer or not required for construction activities should be re-seeded with locally-sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion potential. • All construction vehicles should remain on properly demarcated roads. No construction vehicles should be allowed to drive over the vegetation except where no cleared roads are available. In such cases a single track should be used and multiple paths should not be formed • Regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures.	
Cumulative Impacts	Higher sediment loads in rivers and streams will affect in-stream vegetation and biota	
Residual Impacts	If erosion at the site is controlled, then there will be no residual impact	

Impact Nature: Faunal habitat destruction, alteration and physical disturbance.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (4)	Medium-Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (40)	Low (24)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To some extent	
Mitigation	• Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO, or other suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed off of the construction site. • Fires should only be allowed within fire-safe demarcated areas. • No fuel wood collection should be allowed on-site. • No dogs should be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • No unauthorized persons should be allowed onto the site. • Staff present during the operational phase should receive environmental education so as to ensure that that no hunting, killing or harvesting of plants and animals occurs. • Should the site need to be fenced, the fencing should be constructed in manner which allows for the passage of small and medium sized mammals. Steel palisade fencing (20 cm gaps min) is a good option in this regard as it allows most medium-sized mammals to pass	

	between the bars, but remains an effective obstacle for humans. Alternatively the lowest strand or bottom of the fence should be elevated to 15 cm above the ground at least at strategic places to allow for fauna to pass under the fence. • If electrified strands are to be use, there should be no strands within 20 cm of the ground because tortoises retreat into their shells when electrocuted and eventually succumb from repeated shocks.
Cumulative Impacts	The development would contribute to cumulative faunal impacts in the area, but the extent is small and so the contribution to cumulative impacts would be low.
Residual Impacts	There will be some loss of habitat and landscape connectivity for fauna regardless of mitigation.

Impact Nature: Negative impacts on avifauna as a result of habitat loss, electrocution and collisions with transmission lines.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Short-term (4)
Magnitude	Medium (4)	Low (1)
Probability	Probable (3)	Improbable (1)
Significance	Low (30)	Very Low (6)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation	• The length of any new power lines that need to be installed should be kept to a minimum. • Ensure that all new lines are marked with bird flight diverters along their entire length. If the new lines were to run parallel to existing unmarked lines this would potentially create a net benefit as this could reduce the collision risk posed by the older line. • All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). These activities should be supervised by someone with experience in this field. • Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.	
Cumulative Impacts	The development would contribute to cumulative avifaunal impacts in the area resulting from electrocution and collisions. But given the proximity of the development to the substation, any contribution to impacts are likely to be very small	
Residual Impacts	There will be some loss of habitat and increased risk of collisions for avifauna	

Summary Assessment

The majority of impacts associated with the development could be reduced to a low level through avoidance and mitigation measures. The site is not broadly sensitive and provided that the rocky hill is avoided, impacts on biodiversity would be low and local in nature. The proximity of the site to the existing ESKOM substation as well as the N9 national road significantly reduces the potential impact of the development. The area is already disturbed to some extent and the connectivity of the area has already been impacted by the presence of the road which is mesh-fenced on both sides. The plain adjacent to the rocky hill is very flat, which means that the risk of erosion would be low and the amount of disturbance required during the construction phase could also be kept to a low level as minimal site preparation would be required apart from clearing the larger woody species. No listed or protected plant species were observed in this area and there were not any sensitive areas within this part of the site that would need to be avoided. Overall, should construction proceed within this area, the risk of long-term ecological impacts would be low and the site is a favourable location for the development of a solar energy facility.

Table 2. Summary assessment of the pre- and post-mitigation impacts associated with the construction and operation phases of the project

Impact	Pre Mitigation	Post Mitigation
Disturbance of sensitive plant communities	Medium	Low
Increased alien plant invasion risk	Medium	Very Low
Increased erosion risk	Medium	Very Low
Faunal habitat loss and disturbance	Medium	Low
Negative impacts on avifauna	Low	Very Low

Cumulative Impacts

Cumulative impacts arise from the combined presence of several similar developments within an area which affect ecological processes operating at broader scales or which each have a small impact which becomes significant when combined. There do not appear to be any other solar developments in vicinity which would contribute to cumulative impacts at the site. There is however some intensive agriculture on the property which would disrupt the connectivity of the landscape for certain species and translate into habitat loss for others. The development of the site would add to this cumulative impact. However, the significance of this impact would be low given the overwhelmingly intact nature of the wider landscape and the opportunities fauna would have for finding alternative routes through the area if required.

Mitigation

Prior to construction, once the layout has been finalized, an ecologist should conduct plant sweeps at the site to identify any protected species that might be present at the site within the footprint and which would be suitable for a search and rescue operation. As a general mitigation strategy, an Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing. Thereafter weekly site compliance inspections would probably be sufficient. However, in the absence of the ECO there should be a designated environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills.

6 CONCLUSION & RECOMMENDATIONS

From an ecological perspective, the site is largely favourable for the development of a solar energy facility. With the appropriate avoidance and mitigation measures in place, the risk of significant ecological impact at the site would be minimized. The plains of the site are homogenous and development within this area could proceed with little ecological risk.

Disturbance during the construction phase should be kept to a minimum as the rehabilitation or revegetation of disturbed sites in the karoo can be difficult, and such areas would be prone to alien plant invasion for many years. The flat nature of the site is likely to be an enabling factor which would allow development to take place with minimal disturbance and it is recommended that the construction approach be one based on a philosophy of minimal impact. As with all semi-arid ecosystems, the site is likely to maintain a much higher degree of resilience if vegetation cover is allowed to persist as far as possible through the construction process.

7 ACTIVITIES FOR INCLUSION THE DRAFT EMP

Below are the measures that should be implemented as part of the EMP for the development. The measures below do not exactly match with the impacts that have been identified above, as certain mitigation measures, such as limiting the loss of vegetation may be effective at combating several different impacts, such as erosion, faunal impact etc.

Objective: Limit disturbance of site during construction			
Project component/s	PV or CPV arrays and their support structures; access and maintenance roads; buildings.		
Potential Impact	Loss of plant cover leading to erosion as well as loss of faunal habitat		
Activity/risk source	Construction & site clearing activities		
Mitigation: Target/Objective	Maintain a ground layer to protect the site from erosion and reduce faunal impacts.		
Mitigation: Action/control		Responsibility	Timeframe
(1) Demarcate areas to be cleared (2) Clear larger woody vegetation with least possible impact to ground layer. (3) Erosion control structures should be constructed in areas of water movement (4) Revegetation of cleared areas or monitoring to ensure that recovery is taking place		Management/ECO	Construction
Performance Indicator	Ground layer cover after construction has been completed		
Monitoring	• Document pre- and post- construction cover of the ground layer. • Document revegetation actions taken and their success • Document erosion problems and the control measures implemented		

Objective: Limit alien plant invasion			
Project component/s	All components which create disturbance during construction		
Potential Impact	Alien plant invasion leading to habitat degradation, loss of ecosystem services and loss of biodiversity		
Activity/risk source	Construction related disturbance		
Mitigation: Target/Objective	Low abundance of alien plant species at the site		
Mitigation: Action/control		Responsibility	Timeframe
(1) Clear alien plants on a bi-annual basis.		Management/ECO	Operation
Performance Indicator	Low abundance of alien plant species at the site.		
Monitoring	• Bi-annual monitoring for the presence of alien species at the site • Records of clearing activities and the species involved		

Objective: Limit faunal impacts			
Project component/s	All components which create disturbance during construction, as well as security fencing and transmission lines		
Potential Impact	Loss of habitat and landscape connectivity for terrestrial fauna. Negative impacts on avifauna.		
Activity/risk source	Habitat transformation during construction; site fencing, presence of construction and operation personnel.		
Mitigation: Target/Objective	Low faunal impact, during construction and operation.		
Mitigation: Action/control		Responsibility	Timeframe
(1) Environmental induction for all staff		Management/ECO	Construction &

(2) Ensure bird-friendly design of transmission infrastructure (3) Use low UV lighting at night to avoid attracting insects. (4) ECO on duty during the site clearing (5) Permeable fencing at strategic places (6) No electric fencing within 30cm of the ground		Operation
Performance Indicator	No mortality of fauna during construction No mortality of avifauna during operation	
Monitoring	• Monitoring for compliance during the construction phase • Monitoring for avifaunal impacts by searching under transmission infrastructure for dead birds • Records of all incidents and mitigation measures implemented at sites where repeated impacts occur.	

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9 ANNEX 1. LIST OF PLANTS

List of plant species which were observed at the BioTherm Aberdeen site. All of the observed species are classified by the Threatened Species Programme, Red List of South African Plants (2011) as Least Concern.

Family	Species	Family	Species
ACANTHACEAE	*Blepharis mitrata*	ACANTHACEAE	*Justicia orchioides*
AIZOACEAE	*Plinthus karooicus*	AMARANTHACEAE	*Alternanthera sessilis*
AMARILLIDACEAE	*Haemanthus albiflos*	ANACARDIACEAE	*Rhus longispina*
APOCYNACEAE	*Carissa bispinosa*	APOCYNACEAE	*Fockea sinuata*
APOCYNACEAE	*Duvalia caespitosa*	APOCYNACEAE	*Pachypodium succulentum*
APOCYNACEAE	*Sarcostemma viminale*	ASPARAGACEAE	*Asparagus burchellii*
ASPARAGACEAE	*Asparagus aethiopicus*	ASPARAGACEAE	*Asparagus exuvialis*
ASPARAGACEAE	*Asparagus glaucus*	ASPARAGACEAE	*Asparagus mucronatus*
ASPARAGACEAE	*Sansevieria aethiopica*	ASPHODELACEAE	*Aloe claviflora*
ASPHODELACEAE	*Astroloba congesta*	ASTERACEAE	*Chrysocoma ciliata*
ASTERACEAE	*Conyza bonariensis*	ASTERACEAE	*Cuspidia cernua*
ASTERACEAE	*Eriocephalus ericoides*	ASTERACEAE	*Euryops anthemoides*
ASTERACEAE	*Felicia filifolia*	ASTERACEAE	*Felicia hirta*
ASTERACEAE	*Felicia muricata*	ASTERACEAE	*Gazania krebsiana*
ASTERACEAE	*Helichrysum lucilioides*	ASTERACEAE	*Kleinia longiflora*
ASTERACEAE	*Pegolettia retrofracta*	ASTERACEAE	*Pentzia incana*
ASTERACEAE	*Pentzia sphaerocephala*	ASTERACEAE	*Phymaspermum parvifolium*
ASTERACEAE	*Pteronia viscosa*	ASTERACEAE	*Rosenia glandulosa*
ASTERACEAE	*Senecio acutifolius*	ASTERACEAE	*Senecio radicans*
BIGNONIACEAE	*Rhigozum obovatum*	BRASSICACEAE	*Heliophila suavissima*
BRASSICACEAE	*Lepidium africanum*	CAPPARACEAE	*Boscia albitrunca*
CAPPARACEAE	*Cadaba aphylla*	CELASTRACEAE	*Gymnosporia linearis*
CHENOPODIACEAE	*Chenopodium glaucum*	CHENOPODIACEAE	*Salsola kali*
COLCHICACEAE	*Ornithoglossum viride*	CRASSULACEAE	*Crassula corallina*
CRASSULACEAE	*Crassula capitella*	CRASSULACEAE	*Crassula muscosa*
CUCURBITACEAE	*Kedrostis africana*	CYPERACEAE	*Cyperus capensis*
CYPERACEAE	*Cyperus usitatus*	EBENACEAE	*Diospyros glabra*
EUPHORBIACEAE	*Euphorbia ferox*	EUPHORBIACEAE	*Euphorbia inaequilatera*
FABACEAE	*Acacia karroo*	FABACEAE	*Lessertia pauciflora*
FABACEAE	*Lotononis parviflora*	FABACEAE	*Melolobium candicans*
GERANIACEAE	*Pelargonium carnosum*	GERANIACEAE	*Pelargonium odoratissimum*
GERANIACEAE	*Sarcocaulon patersonii*	HYACINTHACEAE	*Drimia anomala*
HYACINTHACEAE	*Whiteheadia bifolia*	IRIDACEAE	*Babiana sp.*
IRIDACEAE	*Moraea polystachya*	IRIDACEAE	*Tritonia laxifolia*
MALVACEAE	*Grewia robusta*	MALVACEAE	*Hermannia coccocarpa*
MALVACEAE	*Hermannia cuneifolia var. cuneifolia*	MALVACEAE	*Hermannia linearifolia*

MALVACEAE	*Malva parviflora*	MARSILEACEAE	*Marsilea capensis*
MESEMBRYANTHEMACEAE	*Drosanthemum lique*	MESEMBRYANTHEMACEAE	*Mestoklema tuberosum*
MESEMBRYANTHEMACEAE	*Ruschia ferox*	MESEMBRYANTHEMACEAE	*Trichodiadema pomeridianum*
MOLLUGINACEAE	*Limeum aethiopicum*	MOLLUGINACEAE	*Boerhavia coccinea*
PAPAVERACEAE	*Argemone mexicana*	POACEAE	*Aristida adscensionis*
POACEAE	*Aristida congesta*	POACEAE	*Aristida diffusa subsp. burkei*
POACEAE	*Chloris virgata*	POACEAE	*Cynodon incompletus*
POACEAE	*Digitaria eriantha*	POACEAE	*Enneapogon cenchroides*
POACEAE	*Eragrostis biflora*	POACEAE	*Eragrostis chloromelas*
POACEAE	*Eragrostis lehmanniana*	POACEAE	*Eragrostis obtusa*
POACEAE	*Fingerhuthia africana*	POACEAE	*Oropetium capense*
POACEAE	*Melinis nerviglumis*	POACEAE	*Setaria verticillata*
POACEAE	*Schismus barbatus*	POACEAE	*Tragus berteronianus*
POACEAE	*Tragus koelerioides*	POACEAE	*Urochloa panicoides*
SANTALACEAE	*Thesium hystrix*	SANTALACEAE	*Thesium lineatum*
SCROPHULARIACEAE	*Aptosimum elongatum*	SCROPHULARIACEAE	*Jamesbrittenia microphylla*
SCROPHULARIACEAE	*Lightfootia nodosa*	SCROPHULARIACEAE	*Limosella aquatica*
SCROPHULARIACEAE	*Nemesia fruticans*	SCROPHULARIACEAE	*Selago fruticosa*
SCROPHULARIACEAE	*Selago albida*	SCROPHULARIACEAE	*Selago geniculata*
SCROPHULARIACEAE	*Sutera halimifolia*	SOLANACEAE	*Lycium cinereum*
SOLANACEAE	*Lycium oxycarpum*	SOLANACEAE	*Lycium pilifolium*
SOLANACEAE	*Solanum capense*	SOLANACEAE	*Nicotiana glauca*
VISCACEAE	*Viscum obscurum*	VISCACEAE	*Viscum rotundifolium*

10 ANNEX 2. LIST OF MAMMALS

List of mammals which are likely to occur at the proposed BioTherm Aberdeen Solar Facility. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2012.

Scientific Name	Common Name	Status	Habitat	Likelihood
Macroscledidea (Elephant Shrews):				
Macroscelides proboscideus	Round-eared Elephant Shrew	LC	Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover	High
Elephantulus rupestris	Western Rock Elephant Shrew	LC	Rocky koppies, rocky outcrops or piles of boulders where these offer sufficient holes and crannies for refuge.	Low
Elephantulus edwardii	Cape Rock Elephant Shrew	LC	From rocky slopes, with or without vegetation, from hard sandy ground bearing little vegetation, quite small rocky outcrops	High
Tubulentata:				
Orycteropus afer	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	Definite
Hyracoidea (Hyraxes)				
Procavia capensis	Rock Hyrax	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies	High
Lagomorpha (Hares and Rabbits):				
Lepus saxatilis	Scrub Hare	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	Definite
Pronolagus rupestris	Smith's Red Rock Rabbit	LC	Confined to areas of krantzes, rocky hillsides, boulder-strewn koppies and rocky ravines	High
Rodentia (Rodents):				
Cryptomys hottentotus	African Mole Rat	LC	Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils	High
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	Definite
Pedetes capensis	Springhare	LC	Occur widely on open sandy ground or sandy scrub, on overgrazed grassland, on the fringes of vleis and dry river beds.	High
Graphiurus ocularis	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	Low
Graphiurus murinus	Woodland Dormouse	LC	Woodland, rocky areas and shrubland within grassland areas	Low
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
Mus minutoides	Pygmy Mouse	LC	Wide habitat tolerance	High
Mastomys coucha	Southern Multimammate Mouse	LC	Wide habitat tolerance.	Low

Aethomys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially	High
Parotomys brantsii	Brants' Whistling Rat	LC	Associated with a dry sandy substrate in more arid parts of the Nama-karoo and Succulent Karoo. Species selects areas of low percentage of plant cover and areas with deep sands.	Low
Otomys unisulcatus	Bush Vlei Rat	LC	Shrub and fynbos associations in areas with rocky outcrops Tend to avoid damp situations but exploit the semi-arid Karoo through behavioural adaptation.	High
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush	High
Gerbillurus paeba	Hairy-footed Gerbil	LC	Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover	High
Saccostomus campestris	Pouched Mouse	LC	Catholic habitat requirements, commoner in areas where there is a sandy substrate.	High
Malacothrix typica	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
Steatomys krebsii	Krebs's Fat Mouse	LC	Prefer a sandy substrate.	Low
Primates:				
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	High
Eulipotyphla (Shrews):				
Myosorex varius	Forest Shrew	LC	Prefers moist, densely vegetated habitat	Low
Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
Carnivora:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	High
Caracal caracal	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	High
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	High
Panthera pardus	Leopard	NT	Wide habitat tolerance, associated with areas of rocky koppies and hills, mountain ranges and forest	Low
Genetta genetta	Small-spotted genet	LC	Occur in open arid associations	High
Suricata suricatta	Meerkat	LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	Definite
Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Definite
Herpestes pulverulentus	Cape Grey Mongoose	LC	Wide habitat tolerance	High

Vulpes chama	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	High
Canis mesomelas	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	High
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	High
Poecilogale albinucha	African Striped Weasel	LC	Primarily a savanna species that have an annual rainfall of more than 600 mm, although they have been recorded from drier areas.	High
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	High
Mellivora capensis	Ratel/Honey Badger	IUCN LC/SA RDB EN	Catholic habitat requirements	High
Rumanantia (Antelope):				
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	High
Pelea capreolus	Grey Rhebok	LC	Associated with rocky hills, rocky mountainsides, mountain plateaux with good grass cover.	Low
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Definite
Oreotragus oreotragus	Klipspringer	LC	Closely confined to rocky habitat.	Low
Chiroptera (Bats)				
Rousettus aegyptiacus	Egyptian Rousette	LC	Require fruit and caves for roosting in the vicinity	Low
Pipistrellus capensis	Cape Serotine Bat	LC	Wide habitat tolerances, but often found near open water	High
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	In arid areas. often associated with water sources	High
Nycteris thebaica	Egyptian Slit-faced Bat	LC	Wide habitat tolerance	High
Miniopterus schreibersii	Schreibers' long-fingered bat	NT	Cave dwelling and suitable caves are an essential habitat requirement	Low
Myotis tricolor	Temminck's hairy Bat	LC	Occurrence may be governed by the presence of caves	Low
Rhinolophus clivosus	Geoffroy's horsehoe bat	LC	Wide habitat tolerance but Roost in caves	Low
Eidolon helvum	Straw-coloured fruit bat	LC	Occasional migratory visitors within southern Africa	Low

11 ANNEX 3. LIST OF REPTILES

List of reptiles which are likely to occur at the proposed BioTherm Aberdeen Solar Facility site. Habitat notes and distribution records are based on Branch (1988) and Alexander and Marais (2007), while conservation status is from the IUCN Red Lists 2012.

Scientific Name	Common Name	Distribution	Status	Habitat	Likelihood
Tortoises and Terrapins:					
Homopus boulengeri	Karoo Padloper	Endemic	Data Deficient	Karoid regions	High
Psammobates tentorius tentorius	Karoo Tent Tortoise	Endemic	Data Deficient	Varied: usually arid karroid areas or rocky sandveld	High
Pelomedusa subrufa	Marsh Terrapin	Widespread	Data Deficient	Slow-moving & still water, incl temporary pans	High
Snakes:					
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Endemic	Data Deficient	Varied: semi-desert, coastal bush, fynbos & savannah	High
Lamprophis capensis	Brown House Snake	Widespread	Data Deficient	Common in highveld grassland & arid karroid regions, but found everywhere & tolerant of urban sprawl	High
Lamprophis guttatus	Spotted Rock Snake	Endemic	Data Deficient	Inland mnts of Cape & Cape fold mnts, extending into S.Namibia	High
Pseudaspis cana	Mole Snake	Widespread	Data Deficient	Sandy scrubland in SW Cape, highveld grassland & mountainous & desert regions	High
Prosymna sundevalli	Sundevall's Shovel-Snout	Endemic	Data Deficient	Dry areas, incl savannah woodlands, highveld & karroid areas, entering valley bushveld & fynbos in the Cape	Low
Psammophylax rhombeatus	Spotted Or Rhombic Skaapsteker	Widespread	Data Deficient	Highland grassveld & fynbos, entering karroid areas	High
Psammophis notostictus	Karoo Sand or Whip Snake	Widespread	Data Deficient	Arid scrubland & karroid regions	High
Dasypeltis scabra	Common/Rhombic Egg Eater	Widespread	LC	Absent only from true desert & closed-canopy forest	High
Homoroselaps lacteus	Spotted Harlequin Snake	Endemic	Data Deficient	Deserted termite mounds or under rocks in fynbos, coastal scrub, savanna and grassland	Low
Aspidelaps lubricus	Coral Shield Cobra	Widespread	Data Deficient	Karroid & sandveld regions, entering dry valley plains in S and E Cape	High
Naja nivea	Cape Cobra	Widespread	Data Deficient	Arid karroid regions, particularly along river courses, entering well drained open areas along the southern coast	High
Hemachatus haemachatus	Rinkhals	Endemic	LC	Grassland from the coast up to 2500 m	Low
Bitis arietans	Puff Adder	Widespread	Data Deficient	Absent only from desert & mnt tops	High
Lizard and Skinks:					

Acontias meleagris	Cape Legless Skink	Endemic	Data Deficient	Coastal & fynbos vegetation & richer soils associated with dry river courses & inland escarpment	High
Mabuya capensis	Cape Skink	Widespread	Data Deficient	Very varied: arid karroid veld, moist coastal bush, montane grassland, etc	High
Mabuya sulcata	Western Rock Skink	Widespread	Data Deficient	Karroid areas	High
Mabuya variegata	Variegated Skink	Widespread	Data Deficient	Extremely varied; desert, karroid veld, montane grassland, savanna, coastal bush & valley bushveld	High
Nucras livida	Karoo Sandveld Lizard	Endemic	Data Deficient	Well-vegetated sandy flats in karroid veld	High
Pedioplanis burchelli	Burchells' Sand Lizard	Endemic	Data Deficient	Rocky montane grassland	High
Pedioplanis lineoocellata	Spotted Sand Lizard	Endemic	Data Deficient	Very varied: karroid veld, valley bushveld & arid & mesic savannah	High
Pedioplanis namaquensis	Namaqua Sand Lizard	Widespread	Data Deficient	Karroid veld	High
Cordylus cordylus	Cape Girdled Lizard	Endemic	Data Deficient	Diverse, coastal cliffs, rock plateaus in fynbos and montane grassland.	High
Cordylus polyzonus	Karoo Girdled Lizard	Endemic	Data Deficient	Karroid regions, coastal renosterveld and succulent karoo	High
Varanus albigularis	Rock Monitor	Widespread	Data Deficient	Savanna and arid karroid areas	High
Varanus niloticus	Water Monitor	Widespread	Data Deficient	Rivers pans and major lakes	High
Agama aculeata	Ground Agama	Widespread	Data Deficient	Semi desert and savanna	High
Agama atra	Southern Rock Agama	Endemic	Data Deficient	Semi-desert to fynbos, from sea level to mountain tops	High
Chameleons:			Data Deficient		
Bradypodion karroicum	Karoo Dwarf Chameleon	Endemic	Data Deficient	Sparse thorn bushes along river courses; adapting to urban gardens	High
Geckos:			Data Deficient		
Chondrodactylus angulifer	Giant Ground Gecko	Endemic	LC	Gravel plains, interdune spaces & sandy flats	High
Chondrodactylus bibronii	Bibron's Tubercled Gecko	Endemic	Data Deficient	Rocky outcrops, cliffs and large trees	High
Pachydactylus capensis	Cape Thick-toed Gecko	Widespread	Data Deficient	Karroid veld, grassland and mesic savannah	High
Pachydactylus geitje	Ocellated Gecko	Endemic	Data Deficient	Debris, rotting logs, loose lark, moribund termitaria	Low
Pachydactylus maculatus	Spotted Thick-toed Gecko	Endemic	LC	Varied: fynbos & coastal bush to arid karroid veld	High
Pachydactylus oculatus	Golden Spotted Thick-toed Gecko	Endemic	LC	Karroid veld	High
Pachydactylus mariquensis	Marico Thick-toed Gecko	Endemic	Data Deficient	Flat sandy plains with sparse vegetation	High
Ptenopus garrulus	Common Barking Gecko	Endemic	Data Deficient	Desert and semi-desert on various soil types, preferring flat stable sandy soils with sparse vegetation cover	High

12 ANNEX 4. LIST OF AMPHIBIANS

List of amphibians which are likely to occur at the BioTherm Aberdeen Solar Facility site. Habitat notes and distribution records are based on Du Preez and Carruthers (2009), while conservation status is from the IUCN Red Lists 2012.

Scientific Name	Common Name	Status	Habitat	Distribution	Likelihood
Vandijkophrynus gariepensis	Karoo Toad	Not Threatened	Karoo Scrub	Widespread	High
Pyxicephalus adspersus	Giant Bullfrog	Near Threatened	Breed in shallow margins of rain-filled depressions.	Widespread	Low
Xenopus laevis	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	High
Cacosternum boettgeri	Common Caco	Not Threatened	Marshy areas, vleis and shallow pans	Widespread	High
Amietia fuscigula	Cape River Frog	Not Threatened	Large still bodies of water or permanent streams and rivers.	Widespread	High
Tomopterna tandyi	Tandy's Sand Frog	Not Threatened	Nama karoo grassland and savanna	Widespread	High

13 ANNEX 5. LIST OF BIRDS

List of birds which are likely to occur at the BioTherm Aberdeen Solar Facility site. The list is derived from the SABAP 1 and 2 datasets and the South African conservation status from the list of threatened birds available from the Bird Life South Africa website, http://www.birdlife.org.za.

Family	Species	Status	Family	Species	Status
Alaudidae	*Calandrella cinerea*	LC	Alaudidae	*Calendulauda albescens*	LC
Alaudidae	*Calendulauda sabota*	LC	Alaudidae	*Certhilauda curvirostris*	LC
Alaudidae	*Chersomanes albofasciata*	LC	Alaudidae	*Eremopterix australis*	LC
Alaudidae	*Eremopterix verticalis*	LC	Alaudidae	*Galerida magnirostris*	LC
Alaudidae	*Mirafra apiata*	LC	Anatidae	*Alopochen aegyptiacus*	LC
Anatidae	*Anas erythrorhyncha*	LC	Anatidae	*Anas undulata*	LC
Anatidae	*Plectropterus gambensis*	LC	Anatidae	*Tadorna cana*	LC
Apodidae	*Apus affinis*	LC	Apodidae	*Apus caffer*	LC
Burhinidae	*Burhinus capensis*	LC	Capitonidae	*Tricholaema leucomelas*	LC
Charadriidae	*Charadrius pecuarius*	LC	Charadriidae	*Charadrius tricollaris*	LC
Charadriidae	*Vanellus armatus*	LC	Charadriidae	*Vanellus coronatus*	LC
Ciconiidae	*Ciconia ciconia*	LC	Coliidae	*Colius colius*	LC
Coliidae	*Colius striatus*	LC	Coliidae	*Urocolius indicus*	LC
Corvidae	*Corvus albicollis*	LC	Corvidae	*Corvus albus*	LC
Corvidae	*Corvus capensis*	LC	Cuculidae	*Chrysococcyx caprius*	LC
Cuculidae	*Clamator glandarius*	LC	Dicruridae	*Dicrurus adsimilis*	LC
Estrildidae	*Amadina erythrocephala*	LC	Estrildidae	*Estrilda astrild*	LC
Estrildidae	*Lagonosticta senegala*	LC	Falconidae	*Falco biarmicus*	NT
Falconidae	*Falco rupicolus*	LC	Falconidae	*Falco rupicoloides*	LC
Fringillidae	*Crithagra albogularis*	LC	Fringillidae	*Crithagra atrogularis*	LC
Fringillidae	*Crithagra flaviventris*	LC	Fringillidae	*Crithagra gularis*	LC
Fringillidae	*Emberiza capensis*	LC	Fringillidae	*Emberiza impetuani*	LC
Fringillidae	*Emberiza tahapisi*	LC	Fringillidae	*Serinus alario*	LC
Fringillidae	*Serinus canicollis*	LC	Glareolidae	*Rhinoptilus africanus*	LC
Gruidae	*Grus paradisea*	VU	Halcyonidae	*Halcyon albiventris*	LC
Hirundinidae	*Delichon urbicum*	LC	Hirundinidae	*Hirundo albigularis*	LC
Hirundinidae	*Hirundo cucullata*	LC	Hirundinidae	*Hirundo dimidiata*	LC
Hirundinidae	*Hirundo fuligula*	LC	Hirundinidae	*Hirundo rustica*	LC
Hirundinidae	*Riparia paludicola*	LC	Indicatoridae	*Indicator indicator*	LC
Indicatoridae	*Indicator minor*	LC	Laniidae	*Lanius collaris*	LC
Laniidae	*Lanius collurio*	LC	Malaconotidae	*Telophorus zeylonus*	LC
Meropidae	*Merops apiaster*	LC	Motacillidae	*Anthus cinnamomeus*	LC
Motacillidae	*Anthus leucophrys*	LC	Motacillidae	*Anthus similis*	LC
Motacillidae	*Macronyx capensis*	LC	Motacillidae	*Motacilla capensis*	LC
Muscicapidae	*Batis pririt*	LC	Muscicapidae	*Bradornis infuscatus*	LC
Muscicapidae	*Muscicapa striata*	LC	Muscicapidae	*Sigelus silens*	LC

Muscicapidae	*Stenostira scita*	LC	Nectariniidae	*Cinnyris afer*	LC
Nectariniidae	*Cinnyris chalybeus*	LC	Nectariniidae	*Cinnyris fuscus*	LC
Nectariniidae	*Nectarinia famosa*	LC	Numididae	*Numida meleagris*	LC
Otididae	*Ardeotis kori*	VU	Otididae	*Afrotis afra*	LC
Otididae	*Eupodotis vigorsii*	LC	Otididae	*Neotis ludwigii*	VU
Paridae	*Parus afer*	LC	Phalacrocoracidae	*Phalacrocorax africanus*	LC
Picidae	*Dendropicos fuscescens*	LC	Plataleidae	*Bostrychia hagedash*	LC
Plataleidae	*Platalea alba*	LC	Plataleidae	*Threskiornis aethiopicus*	LC
Pteroclididae	*Pterocles namaqua*	LC	Pycnonotidae	*Pycnonotus capensis*	LC
Pycnonotidae	*Pycnonotus nigricans*	LC	Rallidae	*Fulica cristata*	LC
Recurvirostridae	*Himantopus himantopus*	LC	Recurvirostridae	*Recurvirostra avosetta*	LC
Remizidae	*Anthoscopus minutus*	LC	Sagittariidae	*Sagiatarius serpentarius*	NT
Scolopacidae	*Actitis hypoleucos*	LC	Scolopacidae	*Calidris minuta*	LC
Scolopacidae	*Gallinago nigripennis*	LC	Scolopacidae	*Tringa nebularia*	LC
Scolopacidae	*Tringa stagnatilis*	LC	Struthionidae	*Struthio camelus*	LC
Sturnidae	*Creatophora cinerea*	LC	Sturnidae	*Lamprotornis nitens*	LC
Sturnidae	*Onychognathus morio*	LC	Sturnidae	*Onychognathus nabouroup*	LC
Sturnidae	*Spreo bicolor*	LC	Sturnidae	*Sturnus vulgaris*	LC
Upupidae	*Upupa africana*	LC	Viduidae	*Vidua macroura*	LC
Zosteropidae	*Zosterops pallidus*	LC	SYLVIIDAE	*Acrocephalus baeticatus*	LC
Sylviidae	*Apalis thoracica*	LC	ACCIPITRIDAE	*Aquila pennatus*	LC
Ardeidae	*Ardea cinerea*	LC	ARDEIDAE	*Ardea melanocephala*	LC
Ardeidae	*Bubulcus ibis*	LC	ACCIPITRIDAE	*Buteo rufofuscus*	LC
Accipitridae	*Buteo vulpinus*	LC	TURDIDAE	*Cercomela familiaris*	LC
Turdidae	*Cercomela schlegelii*	LC	TURDIDAE	*Cercomela sinuata*	LC
Turdidae	*Cercotrichas coryphoeus*	LC	ACCIPITRIDAE	*Circaetus pectoralis*	LC
Sylviidae	*Cisticola fulvicapilla*	LC	SYLVIIDAE	*Cisticola juncidis*	LC
Sylviidae	*Cisticola subruficapilla*	LC	COLUMBIDAE	*Columba guinea*	LC
Turdidae	*Cossypha caffra*	LC	ACCIPITRIDAE	*Elanus caeruleus*	LC
Sylviidae	*Eremomela gregalis*	LC	SYLVIIDAE	*Eremomela icteropygialis*	LC
Ploceidae	*Euplectes orix*	LC	SYLVIIDAE	*Malcorus pectoralis*	LC
Accipitridae	*Melierax canorus*	LC	TURDIDAE	*Monticola rupestris*	LC
Turdidae	*Myrmecocichla formicivora*	LC	COLUMBIDAE	*Oena capensis*	LC
Turdidae	*Oenanthe monticola*	LC	TURDIDAE	*Oenanthe pileata*	LC
Sylviidae	*Parisoma layardi*	LC	SYLVIIDAE	*Parisoma subcaeruleum*	LC
Ploceidae	*Passer diffusus*	LC	PLOCEIDAE	*Passer domesticus*	LC
Ploceidae	*Passer melanurus*	LC	SYLVIIDAE	*Phragmacia substriata*	LC
Ploceidae	*Ploceus capensis*	LC	PLOCEIDAE	*Ploceus ocularis*	LC
Ploceidae	*Ploceus velatus*	LC	ACCIPITRIDAE	*Polemaetus bellicosus*	VU
Sylviidae	*Prinia flavicans*	LC	SYLVIIDAE	*Prinia hypoxantha*	LC
Ploceidae	*Quelea quelea*	LC	TURDIDAE	*Saxicola torquatus*	LC
Columbidae	*Streptopelia capicola*	LC	COLUMBIDAE	*Streptopelia semitorquata*	LC

Columbidae	*Streptopelia senegalensis*	LC	SYLVIIDAE	*Sylvietta rufescens*	LC
Turdidae	*Turdus olivaceus*	LC			

SHORT CV OF CONSULTANT:

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SUMMARY OF EXPERTISE:

SIMON TODD

- Profession: Ecological Consultant
- Specialisation: Plant & Animal Ecology
- Years of Experience: 15 Years

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Fynbos, Succulent Karoo, Nama Karoo, Thicket, Arid Grassland and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity
- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.

General Experience & Expertise

- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa. Projects have ranged in extent from <50 ha to more then 50 000 ha.
- Extensive experience in the field and exceptional level of technical expertise, particularly with regards to GIS capabilities which is essential with regards to producing high-quality sensitivity maps for use in the design of final project layouts.
- Strong research background which has proved invaluable when working on several ecologically sensitive and potentially controversial sites containing some of the most threatened fauna in South Africa.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of South Africa.
- Maintain several long-term vegetation monitoring projects distributed across Namaqualand and the karoo.
- Guest lecturer at two universities and have also served as an external examiner.
- Reviewed papers for more than 10 international ecological journals.
- Past chairman and current committee member of the Arid Zone Ecological Forum.
- SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

A selection of recent work is as follows:

Specialist Assessments:

Bitterfontein Solar Plant - Fauna & Flora Specialist Assessment. Specialist Report for Cape EAPrac. 2012.

Beaufort West Solar Facility, Erf 7388 - Fauna & Flora Specialist Assessment. Specialist Report for Cape EAPrac. 2012.

Plant Sweeps on Portion 2 of the Farm Demaneng 546, Kuruman District, Northern Cape Province for SA Manganese. 2011.

Proposed Olyven Kolk Solar Power Plant, Northern Cape: Botanical and Faunal Specialist Assessment. Specialist Report for Environmental Resources Management (ERM). 2011.

Klawer Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management. 2011.

Witberg Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management. 2011.

Lambert's Bay Wind Farm: Ecological and Biodiversity Assessment: Terrestrial Vertebrate Fauna & Botanical Specialist Study. Specialist Report for Environmental Resources Management. 2011.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility near Sutherland, Western and Northern Cape Provinces. Specialist Report for Environmental Resources Management. 2011.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility near Beaufort West, Western Cape Province. Specialist Report for Environmental Resources Management. 2010.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy at Konstabel, Western Cape Province. Specialist Report for Environmental Resources Management. 2010.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility at Perdekraal, Western Cape Province. Specialist Report for Environmental Resources Management. 2010.

Environmental Impact Assessment: Terrestrial Ecology Specialist Study for the Proposed Establishment of a Renewable Energy Facility near Victoria West, Western and Northern Cape Provinces. Specialist Report for Environmental Resources Management. 2010.

Research Reports & Peer Reviewed Publications:

Todd, S.W. 2010. Vegetation and Plant Communities Associated with the Tillite and Dolerite Renosterveld Types of the Avontuur Conservation Area, Nieuwoudtville, South Africa. DRYNET.

Todd, S.W., Milton, S.J., Dean, W.R.J. Carrick, P.J. & Meyer, A. 2009. Ecological best Practice Guidelines for the Namakwa District. The Botanical Society of South Africa.

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