SUURWATER 62, BOESMANLAND 75MW SOLAR FARM, AGGENEYS

FAUNA & FLORA SPECIALIST REPORT FOR IMPACT ASSESSMENT

PRODUCED FOR CAPE EAPRAC

ON BEHALF OF

BOESMANLAND SOLAR FARM (PTY) LTD
BY

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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.

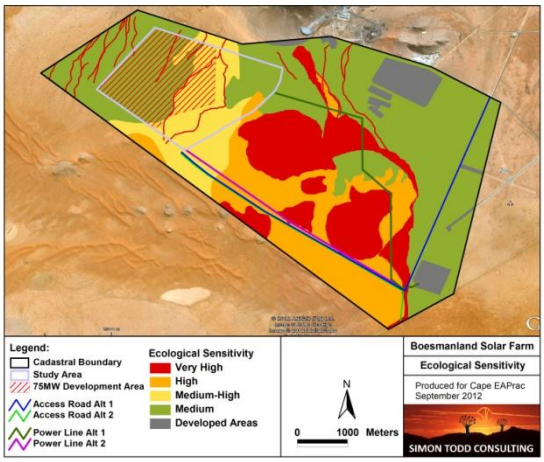
Simon Todd Pr.Sci.Nat

September 2012

EXECUTIVE SUMMARY

This report details the faunal and botanical impacts likely to be associated with the development of a solar PV facility of 75 MW on the farm Zuurwater, near to Aggeneys in the Northern Cape Province.

A site visit and desktop study were conducted to assess the presence and distribution of ecologically sensitive, species and habitats. The results were integrated to produce a sensitivity map for the site which is depicted below. The proposed development area is not viewed as being highly ecologically sensitive on account of a lack of specialized habitats, as well as the abundance and availability of similar habitat in the area. Some issues of potential concern were however identified, including an abundance of the protected plant species *Hoodia gordonii* at the site, as well as the likely presence of the narrow endemic Red Lark, *Certhilauda burra* in the area.



In terms of the likely impacts and risk factors associated with the development, avifaunal impacts and erosion are highlighted as the major concerns. The impacts on larger avifauna could to a large extent be mitigated through the use of bird-friendly design elements on the new power lines required for the development. The Red Lark is associated with the vegetated dunes of the area, which also form a proportion of the proposed development area. The likely impact of the development on this species is however likely to be relatively low on account of the low density of the species and the limited extent of the development within the suitable habitat.

The preferred layout provided by the developer encompasses approximately 270 ha and forms a contiguous block within the western two-thirds of the development area as depicted above. This area includes a few ephemeral washes and the developer proposes to build over these by utilising supports which result in minimal soil disturbance. Provided that these do not impinge on the natural flow of water through the site, this is seen as a potentially acceptable solution. The impacts likely to be associated with the preferred layout were assessed in terms of a number of potential impacts as listed in the summary assessment table provided below.

In terms of local-level biodiversity, the site is not exceptional and the site is not highly sensitive in this regard, as there are no unique, threatened or otherwise unique habitats present which are not widely available in the wider landscape. Although there are a number of nationally or provincially protected species at the site, none of these are rare, and the loss of the affected individuals from the development footprint would not be of wider significance or compromise the viability of the local populations of these species.

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

Impact	Project Phase	Pre Mitigation	Post Mitigation
Impacts on vegetation and protected plant species	Construction	Moderate-High	Moderate-Low
	Operation	Low	Low
Increased alien plant invasion risk	Construction	Moderate	Low
	Operation	Moderate	Low
Increased erosion risk	Construction	Moderate-High	Low
	Operation	Moderate	Low
Faunal habitat loss and disturbance	Construction	Moderate	Moderate
	Operation	Low	Low
Negative impacts on avifauna	Construction	Moderate	Moderate-Low
	Operation	Moderate	Low
Loss of landscape connectivity	Construction	Moderate	Moderate
	Operation	Moderate	Moderate-Low

Provided that reasonable mitigation measures to reduce erosion and the other ecological impacts of the development are implanted, the development of the site as a solar energy facility is not likely to result in long-term degradation of the receiving environment or significant net loss of biodiversity.

1 INTRODUCTION

Boesmanland Solar Farm (Pty) Ltd is proposing to develop a 75MW solar energy facility near Aggeneys in the Northern Cape Province. In terms of the EIA regulations, an environmental authorization is required before the development can proceed. *Cape EAPrac* has been appointed to conduct the EIA process for the development and has subcontracted Simon Todd Consulting to perform a specialist fauna and flora assessment of the site as part of the process.

The development would be situated on the farm Zuurwater approximately 8 km west of Aggeneys, adjacent to the Black Mountain Mine. In order to achieve the desired 75 MW output, approximately 265 ha of space to install the solar panels would be required. Various access roads, infrastructure and a short transmission line to link the development to the existing Aggeneis Eskom substation would also be required.

The detailed terms of reference for the project are detailed below:

1.1 TERMS OF REFERENCE

Vegetation Study

- Carry out fieldwork to locate and describe the current state of vegetation on the study area, key focus on the impact footprint(s) for site, so that there is a baseline description/status quo against which impacts can be identified and measured.
- Determine the species present and localities within each vegetation types.
- Generate a vegetation map showing the site in relation to any Critical Biodiversity Areas and links to ecological corridors and support areas, vegetation sensitivity, disturbed, transformed and potential “no-go” areas.
- Determine whether the study area falls wholly or partially within the distribution range of species listed as Vulnerable, Endangered or Critically Endangered and Protected.
- Provide site photos that show the current state of the vegetation (i.e. natural, transformed, disturbed etc.). Identify and describe the conservation value and conservation planning frameworks relevant to this site (Regional Planning) for represented vegetation units.
- A detailed list of species of special concern.
- An indication of the irreplaceability value of vegetation types present on site.
- Describe the areas where indigenous vegetation has been transformed.
- Determine alien species present; their distribution within the study area and recommended management actions.
- A description of different micro-habitats, and the species associated with those habitats.
- Note and record the position of unusually large specimens of trees.
- Describe the potential direct, indirect and cumulative negative and positive impacts of the proposed activity on vegetation species during the construction, operation and decommissioning phases of the project.

- Identification of issues and potential direct, indirect and cumulative biodiversity impacts, which are to be considered in combination with any additional relevant issues that may be raised through the public consultation process. These include:
    - The cumulative impact of clearing for the construction of solar facilities on floral species of concern both on the farm and in the greater area.
- Disclose any gaps in information or assumptions made.
- Recommendations for mitigatory measures to minimise impacts identified.
- An outline of additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the Environmental Management Programme (EMPr), as well as generic rehabilitation and re-vegetation guidelines.

Faunal Study

- Carry out fieldwork to describe and assess the current state of terrestrial fauna in the area so that there is a baseline description/status quo against which impacts can be identified and measured.
- Conduct a faunal assessment that can be integrated into the ecological study.
- Describe the existing impacts of current land use, as they affect the fauna.
- Describe the different micro-habitats, and the species associated with those habitats.
- Describe the potential direct, indirect and cumulative negative and positive impacts of the proposed activity on inhabitant and reliant faunal species during the construction, operation and decommissioning phases of the project.
- Provide a detailed fauna sensitivity map of the site, including mapping of faunal community disturbance, transformation and potential “no-go” areas on site.
- Clarify species of special concern (SSC) and that are known to be:
    - endemic to the region;
    - that are considered to be of conservation concern;
    - that are in commercial trade (CITES listed species);
    - or, are of cultural significance.
- A description of species composition and conservation status in terms of protected, endangered or vulnerable faunal species.
    - This description will include species which are likely to occur within, traverse across or forage within the proposed project area, as well as species which may not necessarily occur on site, but which are likely to be impacted upon as a result of the proposed development.
- Identification of issues and potential direct, indirect and cumulative biodiversity impacts which are to be considered in combination with any additional relevant issues that may be raised through the public consultation process. These include:
    - The cumulative impact of clearing for the construction of solar facilities on faunal species of concern both on the farm and in the greater area.

General Considerations:

- Disclose any gaps in information or assumptions made.
- Recommendations for mitigatory measures to minimise impacts identified.
- An outline of additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the Environmental Management Programme (EMPr) for faunal related issues.

A description of the potential impacts of the development and recommended mitigation measures are to be provided which will be separated into the following project phases:

- Pre-construction
- Construction
- Operational phases

1.2 DATA REVIEW & SOURCING

Apart from the data collected on-site, other data sources consulted and used where necessary in the study include the following:

Vegetation:

- Vegetation types and their conservation status was extracted from the South African National Vegetation Map (Mucina and Rutherford 2006).
- Information on plant and animal species recorded for the Quarter Degree Squares (QDS) 2918BA, BB, BC and BD was extracted from the SABIF/SIBIS database hosted by SANBI.
- The IUCN conservation status (Table 1) of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2011).
- Threatened Ecosystem data was extracted from the National List of Threatened Ecosystems 2010.
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas 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 site lies within the planning domain of the Namakwa District Biodiversity Sector Plan (Desmet & Marsh 2009)

Fauna

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and various spatial databases (SANBI's SIBIS and BGIS databases).
- Literature consulted include 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 reptile list derived from the literature was also supplemented with species known to occur in the area extracted from the SARCA web portal, hosted by the ADU, http://vmus.adu.org.za
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary 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) (see Table 1) 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

2 REGULATORY AND LEGISLATIVE OVERVIEW

A summary of the relevant portions of the Acts which govern the activities and potential impacts on 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 of 1998, as amended):

NEMA requires that measures be 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.

Environmental 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. The ECA requires that developers must undertake Environmental Impact Assessments (EIA) for all projects listed as a Schedule 1 activity in the EIA regulations.

National Environmental Management: Biodiversity Act (NEMBA) (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).

A ToPS permit is required for any activities involving any T0PS listed species. In the Northern Cape this takes the form of an Integrated Permit which meets both national and provincial permitting requirements. This permit application form can be obtained from the Northern Cape Department of Environment and Nature Conservation (DENC) permit office in Kimberly.

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 2 of 2010** (*R.545*) the following activities are likely to be triggered:

Activity 1: The construction of facilities or infrastructure, including associated structures or infrastructure, for -

(a) the generation of electricity where –
(i) the electricity output is 20 megawatts or more; or
(ii) the elements of the facility cover a combined area in excess of 1 hectare;

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".*

No protected tree species were observed at the site and although the site lies within the distribution range of protected species such as *Boscia albitrunca*, no protected species were observed within the development area.

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

The Conservation of Agricultural Resources Act (CARA) 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 CARA 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.

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

The purpose of this Act is to prevent and combat veld, forest and mountain fires. The Act provides for a variety of institutions, methods and practices for achieving the purpose, such as the formation of fire protection associations. It also places responsibility on landowners to develop and maintain firebreaks as well as be sufficiently prepared to combat veld fires. Landowners may be held responsible for damage to property from fires which begin on their properties.

The site is arid with sparse vegetation cover and fires are not a natural phenomenon in the area. However, under exceptional circumstances, such as following years of very high rainfall, sufficient biomass may build up to carry fires. Therefore, management of plant biomass within the site should be part of the management of the facility. Grazing by livestock is the simplest and most ecologically sound way to manage plant biomass and is recommended the preferred method to manage plant biomass at the site.

Northern Cape Nature Conservation Act (No. 9 of 2009):

The Northern Cape Nature Conservation Act provides *inter alia* for the sustainable utilisation of wild animals, aquatic biota and plants, as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act, the following Section may be relevant with regards to any security fencing the development may require.

Manipulation of boundary fences

19. No Person may –

(a) erect, alter remove or partly remove or cause to be erected, altered removed or partly removed, any fence, whether on a common boundary or on such person's own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom;

The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), Protected (schedule 2) to Common (schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2, except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under Schedule 1 or 2. Of relevance for the current development is the fact that several plant families and genera are listed in their entirety as protected, this includes, inter alia *Mesembryanthemaceae*, *Amaryllidaceae*, *Apocyanceae*, *Asphodeliaceae*, *Crassulaceae*, *Iridaceae* and *Euphorbia*. Although there are few species of conservation concern within these families and genera at the site, the species present within the development footprint will need to be listed with the permit application. A permit obtainable from the DENC permit office in Kimberly would be required for the site clearing. A permit would also be required to destroy or translocate any nationally or provincially listed species from the site. A single integrated permit, which covers all of these permitting requirements as well as meets TOPS regulations, will be required.

3 METHODOLOGY

3.1 SITE VISIT

The site visit took place on the 28th of February 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 location of all listed plant species observed was recorded using a GPS. Active searches for reptiles and amphibians were also conducted within habitats likely to harbour 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 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. 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, conservation value 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. There were however no Low Sensitivity areas within the study area.

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

3.3 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. There had been some rainfall in the period preceding the site visit, and the vegetation within the drainage lines and run-on areas was green and growing with many species in flower. However, the rainfall had not been sufficient to stimulate large amounts of annuals, forbs or geophytes and as a result the plant species list obtained for the site can be considered to be representative of the trees, shrubs and grasses only. In order to overcome this potential limitation, the list of species observed during the site visit was supplemented with a list of those protected or endangered species which are known to occur in the area. 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.

3.4 RELEVANT ASPECTS OF THE DEVELOPMENT

A single site is being considered and alternative sites are not being assessed or compared to one another. The site is roughly square in shape and 440 ha in extent. A satellite image of site is depicted below in Figure 1. The proposed development area is a generally flat, undulating plain of low dunes and sandy areas interspersed with gravel and stony plains. Those parts of the site with sandy soils tend to be dominated by perennial grasses with scattered shrubs and low trees, while the areas of stony and gravel plains are dominated by woody shrubs and occasional succulents. There are no significant rocky outcrops or large drainage lines within the proposed development area itself, although these features are present within the broader study area.

Important aspects of the construction and infrastructure of the development which are potentially relevant to assessing the likely impacts of the activities associated with the development include the following:

- Solar PV Arrays will be installed in rows at the site. They will be mounted on steel structures which will be piled or cemented into the ground depending on soil conditions. According to the developer, the preferred technology allows for a small disturbance footprint on the ground and allows arrays to be constructed over the wash lines and high sensitivity areas while having a minimal effect on the vegetation, mitigating the chances of erosion.
- Underground cabling will run the length of the arrays and will link the arrays to inverters.
- A grid connection substation will be constructed which will house the power transformers which will increase the voltage before it connects to the ESKOM grid via a short overhead line.
- Two overhead power line options are being considered as part of the development:
    - Power Line Alternative 1 links the facility to the ESKOM Aggeneys substation via an easterly route towards the Black Mountain mine.
    - Power Line Alternative 2 follows the western boundary of the site and runs adjacent to the existing ESKOM powerline until it reaches the site.
- Service roads will run between the rows of arrays and will be used for maintenance activities such as cleaning the arrays.
- Two access alternatives are being considered, which differ only in their initial alignment:
    - Access Road Alternative 1 comes off the mine access road and runs along the northern side of the runway until it reaches the ESKOM substation from which it follows the same route as Alternative 2 along the existing ESKOM service road beneath the power line.
    - Access Road Alternative 2 comes straight off the N14 to the ESKOM substation and follows the same route as Alternative 1 thereafter.
- The site access road for the development will be along the southern boundary of the site and will run beneath the existing ESKOM transmission line which runs past the site.

Additional permanent infrastructure and temporary construction activities which will occur at the site will include:

- Auxilliary Electrical equipment
- A small site office and storage facility, including security and ablution facilities
- Temporary construction camp
- A lay-down area for the temporary storage of materials during the construction activities.

A number of different layouts were developed during the course of the Scoping and EIA phases of the development, ultimately leading to the production of the preferred layout, which is depicted below in Figure 1. The major factors which lead to this layout include consideration of:

- Minimal disturbance to washes and highly sensitive areas
- Minimum distance to the substation
- A uniform area of around 265 ha to ensure the project would be economically viable

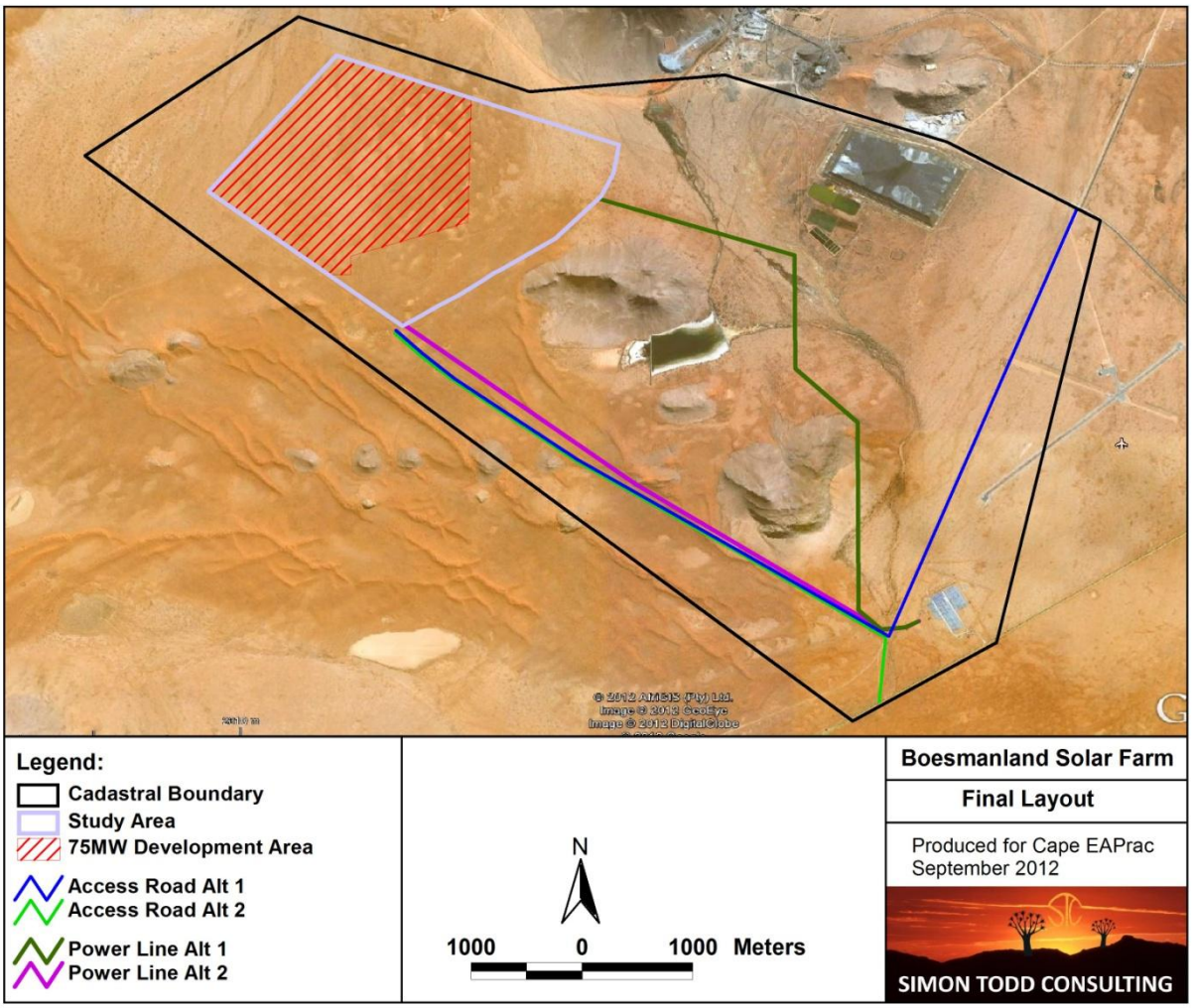


Figure 1. The final layout of the proposed 75 MW Boesmanland Solar Farm including the various access road and power line alternatives.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

4.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford 2006), the site lies entirely within the Bushmanland Sandy Grassland vegetation type (Figure 2). This vegetation type occurs on red sands along the Koa River valley, southeast and west of Aggeneys, as well as on the eastern edge of the Bushmanland basin near Copperton. This vegetation unit occupies an area of 2283 km^2 and has not been significantly impacted by transformation and is classified as Least Threatened. Other important vegetation types which occur in the vicinity of the site include Bushmanland Inselberg Shrubland, Bushmanland Arid Grassland and Aggeneys Gravel Vygieveld. All of these vegetation types are also classified as Least Threatened and have not been significantly impacted by transformation. Of these vegetation types, only Aggeneys Gravel Vygieveld contains a significant

number of endemic species, most of which are dwarf succulents in genera such as *Conophytum, Dinteranthus* and *Lithops*.

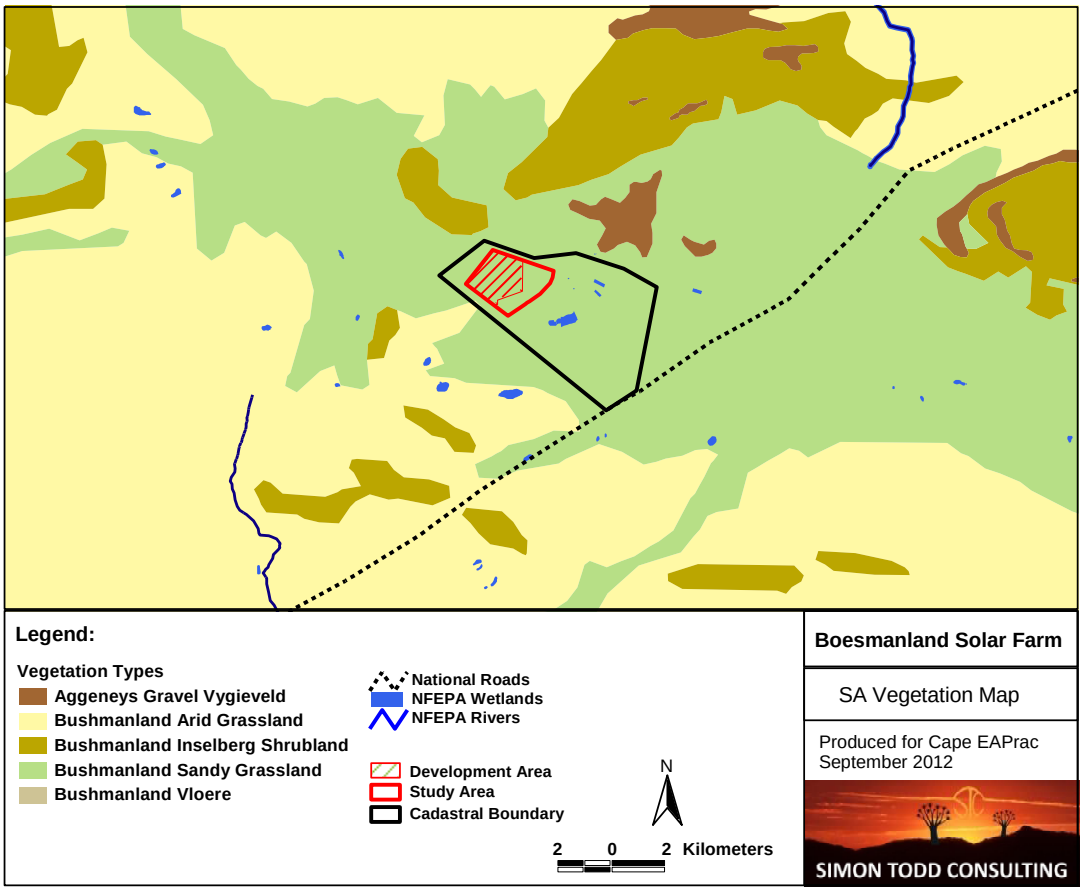


Figure 2. The broad-scale vegetation in and around the proposed Boesmanland Solar Farm. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers, wetlands and pans delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

4.2 Fine-Scale Vegetation Patterns

Although the vegetation of the site has been classified as a single vegetation type, there are in fact several different plant communities present. Soil depth and texture appear to be key drivers of the vegetation patterns at the site. A total of 91 species were recorded at the site during the site visit, suggesting that the site has reasonably high species diversity. As each of the different communities present has relatively low species richness, the richness results largely from turnover between the different habitats and plant communities. The different plant communities observed at the site are mapped below in Figure 3 and those that occur within the development area are then described below in detail with their characteristic species.

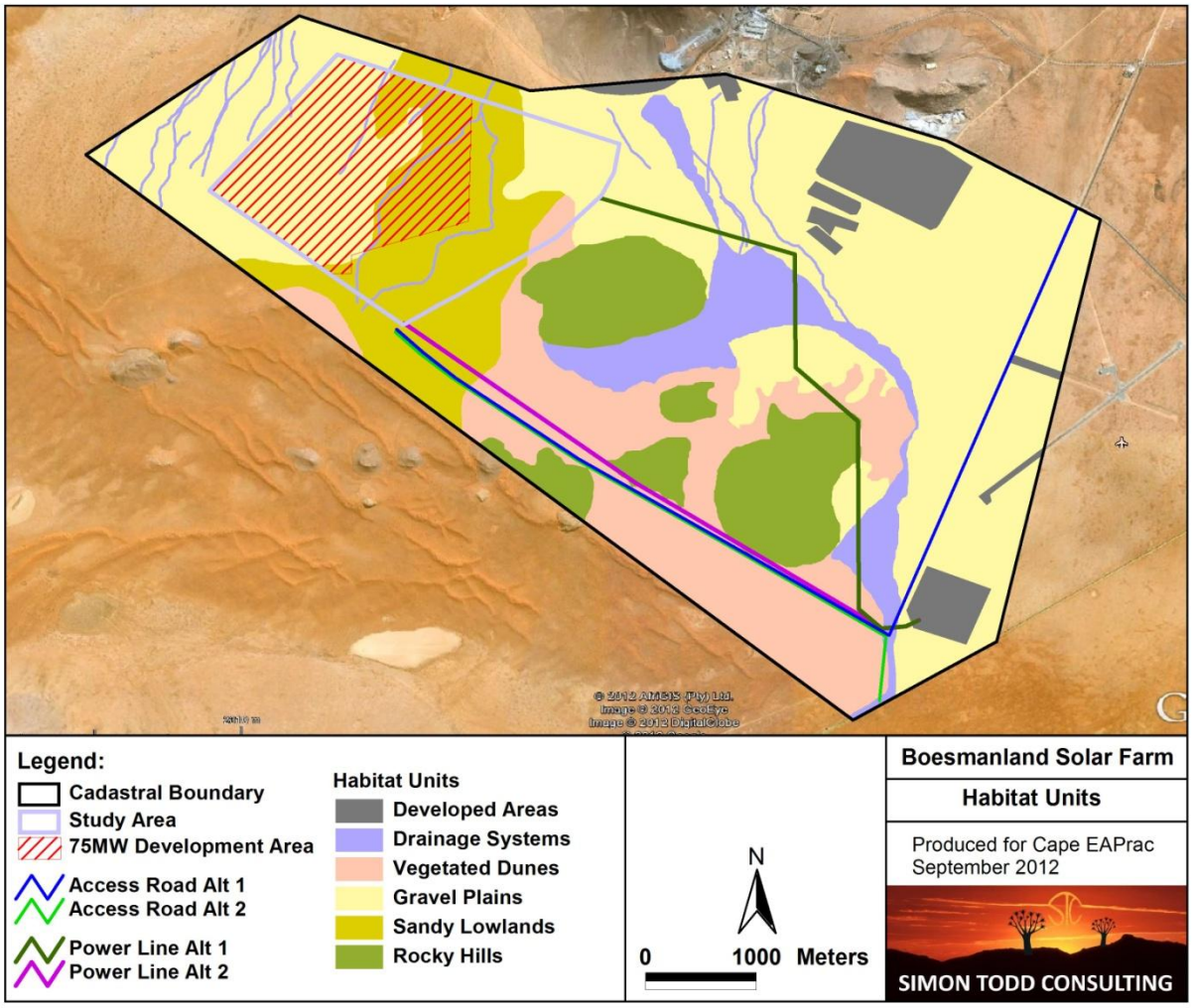


Figure 3. Habitat units identified and mapped at the site. The development area is restricted to the gravel plains and sandy lowlands habitat units.

Drainage Lines and Washes

Due to the high infiltration capacity of the deep sands which characterize a large proportion of the site there are few drainage lines within the proposed development area. The drainage lines that are present have their origin in the rocky hills outside of the site. Within the proposed development area, the drainage lines are generally wide and open, with a flat sandy bed. The drainage lines were dominated by *Stipagrostis ciliata* and *Stipagrostis namaquensis*, with scattered shrubs such as *Sisyndite spartea*, *Salsola namibica*, *Trichodesma africanum* and *Lycium pumilum*.

Figure 4. Typical example of one of the larger drainage lines within the proposed development area. The bed is dominated by *Stipagrostis ciliata* with scattered *Sisyndite spartea* shrubs.

Sandy Lowlands

A large proportion of the proposed development area as well as the broader site are characterized by the presence of deep, red Kalahari sand, which forms flats, low or occasionally taller vegetated dunes. Typically these areas are dominated by perennial bushman grasses with scattered shrubs and low trees. Dominant grasses include *Stipagrostis brevifolia*, *S.ciliata*, *S.anomala*, *S,obtusa* and *S.uniplumis*, while shrubs include *Rhigozum trichotomum, Hermannia affinis*, *Lycium eenii* and *Calabota spinescens*. Occasional low trees include *Parkinsonia africana* and *Boscia foetida*. In the areas of larger dunes, species such as *Cladoraphis spinosa*, *Leucophrys mesocoma*, *Stipagrostis amabilis, Hermannia tomentosa* and *Crotalaria orientalis* were prevalent. This community is has a relatively low plant diversity and is not considered highly sensitive. The only species of conservation concern observed with this area was *Hoodia gordonii*, which is a nationally protected species.

Figure 5. Typical view of the vegetation which occurs on the deep sands of the Sandy Lowlands habiat type. The vegetation is dominated by *Stipagrostis brevifolia* and the low tree is *Parkinsonia africana*.

Gravel Plains

The east and western margins of the proposed development area is characterized by the presence of gravel plains with low, open shrubby vegetation. These areas are dominated by shrubs such as *Eriocephalus spinescens*, *Zygophyllum retrofractum*, *Euphorbia spinea*, *Sarcocaulon crassicaule*, *Salsola rabieana*, *Hermannia stricta*, *H.spinosa* and *Ruschia spinosa*. The dominant grass in these areas is *Enneapogon scaber*. Larger shrubs and trees which occur occasionally include *Lycium cinereum* and *Boscia foetida*. Given the wide distribution of the species within this community and the broad availability of this habitat type in the area, this community is not considered to the ecologically sensitive. The only species of conservation concern that was observed is *Hoodia gordonii*, which was abundant in some parts, particularly towards the west of the proposed development area.

Figure 6. The Gravel Plains plant community type, which characterizes a large part of the western portion of the proposed development area.

4.3 SPECIES OF CONSERVATION CONCERN

According to the SANBI SIBIS database and Threatened Species Programme, Red List of South African Plants (2011), as many as 22 species of conservation concern occur in the broad area surrounding the site. These are listed below in Table 2. Conspicuous among the list is large number of Mesembryanthemaceae present. These and many of the others are associated with the inselbergs of the area, and do not occur on sandy flats, such as the study area. Therefore, the actual number of species which might occur within the study area is significantly less. Of the species in the list only *Hoodia gordonii* was observed within the site. *Conophytum limpidum* was also observed during the site visit, but outside of the study area to the northwest on a gravel plain associated with the mountain slope to the north. Suitable habitat for this species did not appear to occur within or near the development area. Although some of the other listed species may occur at the site, most of the listed species are associated with inselbergs and quartzite patches and are not likely to occur at the site, but may be present on the adjacent mountains.

A number of provincially protected species occur within the site including *Boscia foetida* and several *Euphorbia* species. A preconstruction survey of the final development footprint will need to be conducted to ascertain the identity and exact number of individuals of protected species affected by the development. Species such as *Euphorbia* and *Hoodia* are suitable for translocation and should

be translocated to a similar habitat outside the development footprint prior to the commencement of construction.

Table 2. Listed flora which are known from the area surrounding the Boesmanland Solar Facility. Only *Hoodia gordonii* was observed at the site.

Family	Species	IUCN Status
MESEMBRYANTHEMACEAE	*Conophytum burgeri*	EN
AMARYLLIDACEAE	*Brunsvigia herrei*	VU
MESEMBRYANTHEMACEAE	*Conophytum ratum*	VU
MESEMBRYANTHEMACEAE	*Lithops olivacea*	VU
PORTULACACEAE	*Avonia herreana*	VU
MESEMBRYANTHEMACEAE	*Conophytum limpidum*	NT
ASPHODELACEAE	*Bulbine striata*	Critically Rare
CRASSULACEAE	*Adromischus diabolicus*	Rare
CRASSULACEAE	*Crassula exilis subsp. exilis*	Rare
FABACEAE	*Crotalaria pearsonii*	Rare
HYACINTHACEAE	*Lachenalia polypodantha*	Rare
MESEMBRYANTHEMACEAE	*Cephalophyllum fulleri*	Rare
MESEMBRYANTHEMACEAE	*Cephalophyllum staminodiosum*	Rare
MESEMBRYANTHEMACEAE	*Conophytum tantillum subsp. eenkokerense*	Rare
HYACINTHACEAE	*Daubenya namaquensis*	Rare
FABACEAE	*Acacia erioloba*	Declining
APOCYNACEAE	*Hoodia gordonii*	DDD
AMARYLLIDACEAE	*Brunsvigia namaquana*	DDT
MESEMBRYANTHEMACEAE	*Drosanthemum breve*	DDT
MESEMBRYANTHEMACEAE	*Drosanthemum godmaniae*	DDT
MESEMBRYANTHEMACEAE	*Ruschia aggregata*	DDT
MESEMBRYANTHEMACEAE	*Trichodiadema obliquum*	DDT

4.4 Critical Biodiversity Areas & Broad-Scale Processes

The site falls within the planning domain of the Namakwa Biodiversity Sector Plan (Desmet & Marsh 2008). 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 meet national biodiversity objectives. When incorporated into municipal SDFs and bioregional plans, such fine-scale plans are recognized under NEMA and the various activities listed under the act as described in Section 2.4 come into effect. The CBA map for the general area surrounding the site is depicted in Figure 7, below. The map illustrates that the southern corner of the proposed development area falls within an Ecological Support Area. Although Ecological Support Areas should be maintained in a natural to near-natural state, the extent to which the development impinges on the ESA is minimal and it would be highly unlikely to disrupt the ecological functioning of the ESA and is not viewed as being significant. A large proportion of the site in the west falls within a CBA and activities within this area should proceed with caution in order to avoid impacts to

the CBA. In addition to the CBA, the proposed development area and a large proportion of the broader site falls within a National Protected Areas Expansion Strategy focus area. This indicates that the site is potentially important from a broad-scale conservation perspective. Measures to ensure that the development does not impact on broader-scale ecological processes should therefore be implemented. Given the proximity of the site to the Black Mountain Mine, it is however unlikely that the development of the site would lead to broad-scale disruption of ecological processes, given that there is a large amount of less disturbed land to the north and south of the site which contains very similar habitat.

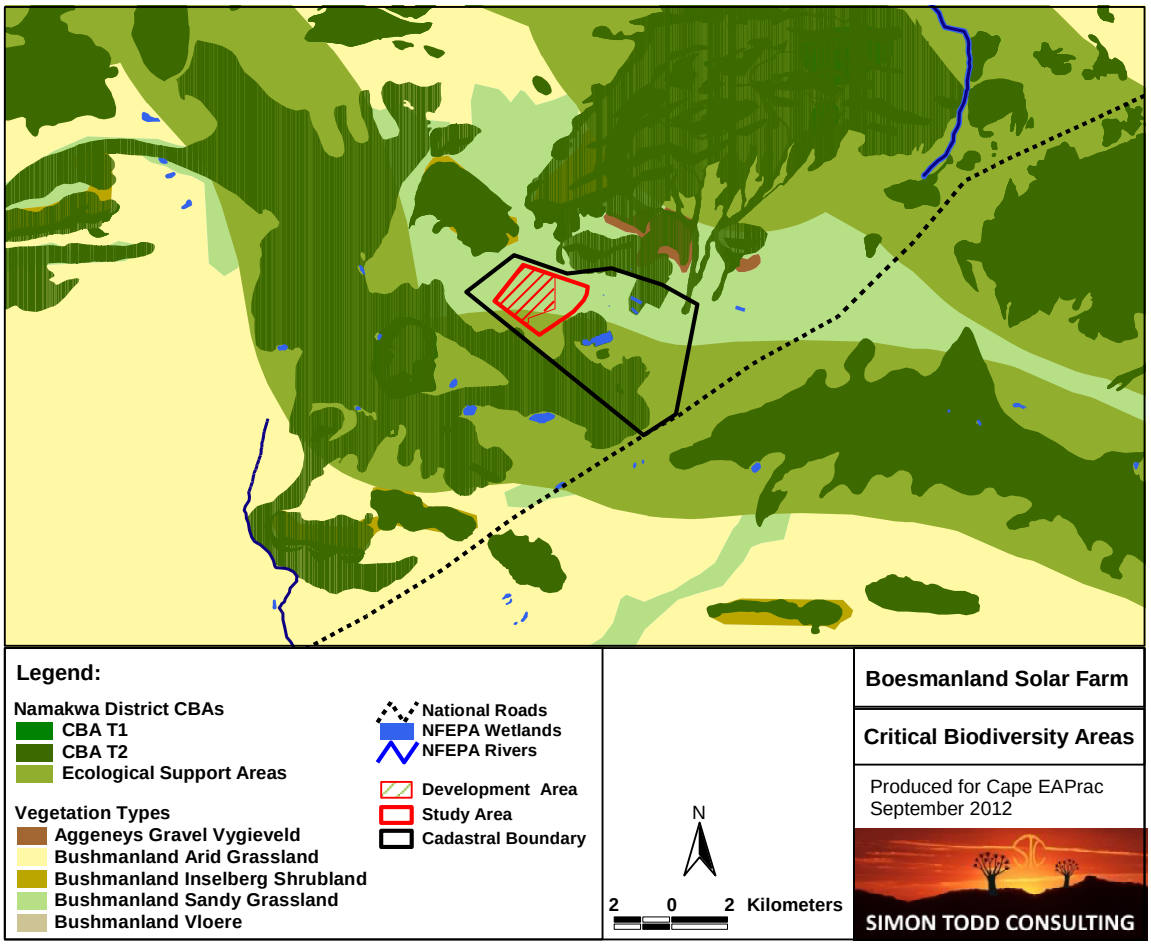


Figure 7. Critical Biodiversity Areas map for the Boesmanland Solar Farm and surrounding area. A large part of the broader site falls within Critical Biodiversity Areas, while the southern part of the proposed development areas falls within an Ecological Support Area. No parts of the development area fall within a CBA and small proportion falls within an Ecological Support Area.

The preferred access road and power line options traverse the CBA along the western boundary of the site. There is however already a power line and associated service road in this area and the new overhead line required for the development will run adjacent to the existing line. The service road for the existing ESKOM power line will be upgraded to provide access to the site. This route was assessed in the field during the site visits and is not likely to generate any significant direct impacts on biodiversity. Furthermore, the total habitat loss that would result from the road construction is

low and the impacts on the ecological functioning and biodiversity potential of the CBA would be minimal.

4.5 FAUNAL COMMUNITIES

Mammals

The site falls within the distribution range of 40 terrestrial mammals and 4 bats, indicating the mammalian diversity at the site is of moderate to low diversity. Two listed species may occur in the area, the Black-footed cat *Felis nigripes* (Vulnerable) and Leopard *Panthera pardus* (Near Threatened). Given the agricultural activity that takes place in the area, the abundance of Leopard in the area is likely to be very low. The habitat is suitable for the Black-footed Cat which favours a mix of open and more densely vegetated areas. However this species is widely distributed across the arid and semi-arid areas of South Africa, and the development would not amount to a significant amount of habitat loss for this species.

In terms of important mammalian habitats in the vicinity of the development, the rocky hills, inselbergs and larger drainage lines can be singled out as being the most significant. Compared to the adjacent plains the rocky habitats are likely to harbour far greater species richness, particularly of small mammals. Species associated with such rocky outcrops include Rock Hyrax *Procavia capensis*, Klipspringer *Oreotragus oreotragus*, Pygmy Rock Mouse *Petromyscus collinus*, Namaqua Rock Mouse *Aethomys namaquensis* and Western Rock Elephant Shrew *Elephantulus rupestris*. The open plains such as those which occur within the proposed development area are likely to be dominated by species associated with open hard or sandy ground such as various gerbils such as Hairy-footed Gerbil *Gerbillurus paeba* and Highveld Gerbil *Gerbilliscus brantsii*. Other mammals observed at the site include South African Ground Squirrel *Xerus inauris* and Cape Porcupine *Hystrix africaeaustralis*.

There are no highly significant habitats for mammalian fauna within the proposed development area, and the loss of habitat within this area as a result of the development would not have a high impact on the broader richness of mammals in the area.

Reptiles

The site lies in or near the distribution range of at least 49 reptile species (Appendix 3), indicating that the reptile diversity at the site is likely to be quite high. Given the variety of habitats available at the site which range from sandy plains and dunes, to rocky plains and outcrops to drainage lines, a large proportion of these reptiles are likely to occur at the site. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 1 tortoise, 19 snakes, 19 lizards and skinks, one chameleon and 9 geckos. Within the proposed development area, only those species associated with sandy and gravel flats are likely to occur. As a result, a large proportion of the geckos and girdled lizards known from the area are likely to be absent from the development area. The only listed reptile species known from the area is the Armadillo Girdled Lizard *Cordylus cataphractus.* This species is however restricted to rocky outcrops and would not occur within the proposed development area.

Apart from a relatively small direct loss of habitat, the shading of the soil by the solar panels is likely to affect reptile composition, as the shading is likely to alter soil temperatures which will have implications for the activity patterns of cold-blooded animals. Most reptiles are also sensitive to the amount of plant cover which is also likely to be affected by the arrays. The presence of the arrays and electrical infrastructure would however create additional habitat for species which utilise such structures such as tubercled geckos (*Chondrodactylus* spp) and agamas (*Agama* spp).

Amphibians

The site lies within the distribution range of only four amphibian species which can be ascribed to the aridity of the area. The proposed development area is not likely to be an important area for amphibians within the context of the site as there is little suitable cover or habitat present within this area. In the broader area, the settling ponds associated with the mine and their overflow are likely to be important as amphibian foraging and breeding habitat. The greatest risk factor associated with the development in terms of amphibians is pollution spills which may occur during the construction phase and which could affect amphibians in downstream areas.

Avifauna

According to the SABAP 1 and 2 data sets, 174 bird species are known from the broad area surrounding the Boesmanland Solar Farm site. This includes 12 IUCN listed species, detailed below in Table 3. The smaller species such as the larks would be affected by habitat loss in the developed areas, while the larger species and raptors would be affected by habitat loss as well as the risk of collisions and electrocution from power-line infrastructure. Collisions and electrocution from power-line infrastructure are significant causes of mortality for bustards, flamingos, eagles and vultures. The construction of new power lines is therefore a potentially significant source of impact for these species. Although the length of the proposed power line infrastructure is quite short, new lines can result in significant mortality if they lie across flight paths and other areas of high activity. These impacts can to a large degree be mitigated by fitting bird flappers to the new lines to reduce collisions as well as insulating the live infrastructure to avoid electrocution. Although the development area is just outside one of Birdlife South Africa's Important Bird Areas, the eastern section of the site falls within an Important Bird Area, which is related to the presence of the Red Lark *Calendulauda burra* in the area (Birdlife International 2012). The habitat of this species is well vegetated red dunes dominated by perennial tussock grasses such as *Stipagrostis*. As previously described in the vegetation section, this corresponds to the Sandy Lowlands and Vegetated Dunes habitat types which occupy a proportion of the development area. Based on the reported density of this species in the area (Dean et al. 1991), the maximal number of birds that would be affected considering the extent of suitable habitat at the site and assuming a high density of birds, would be less than 10. However, it is unlikely that the site represents optimal habitat for this species as it was heavily grazed at the time of the site visit and grazing pressure has been listed as the major threats to this species. Therefore it is more realistic to expect that even less than 10 individuals would be directly affected, which is not highly significant considering the estimated population size of 9400 (BirdLife International (2012) Species factsheet: *Certhilauda burra*).

Table 3. Listed bird species which are known to occur in the vicinity of the Aggeneys Solar Facility site.

Family	Scientific Name	Common Name	Status	Primary Threat
Alaudidae	*Certhilauda burra*	Lark, Red	VU	Habitat Loss
Alaudidae	*Spizocorys sclateri*	Lark, Sclater's	NT	Habitat Loss
Charadriidae	*Charadrius pallidus*	Plover, Chestnut-banded	NT	Habitat Loss
Ciconiidae	*Ciconia nigra*	Stork, Black	NT	Collision
Falconidae	*Falco biarmicus*	Falcon, Lanner	NT	Collision
Otididae	*Ardeotis kori*	Bustard, Kori	VU	Collision
Otididae	*Neotis ludwigii*	Bustard, Ludwig's	VU	Collision
Phoenicopteridae	*Phoenicopterus ruber*	Flamingo, Greater	NT	Collision
Sagittariidae	*Sagittarius serpentarius*	Secretarybird	NT	Collision
Accipitridae	*Circus maurus*	Harrier, Black	NT	Collision
Accipitridae	*Gyps africanus*	Vulture, White-backed	VU	Collision/Electrocution
Accipitridae	*Polemaetus bellicosus*	Eagle, Martial	VU	Collision/Electrocution

4.6 SITE SENSITIVITY ASSESSMENT

The ecological sensitivity map for the site is depicted below (Figure 8). The proposed development area is largely suitable for development and the only significant ecological features within the development area are a few drainage lines. The eastern section of the proposed development area falls within the Sandy Lowlands habitat unit which is classified as slightly higher sensitivity than the rest of the site on account of the possible presence of the Red Lark in this area.

The final layout of the facility consists of panels arranged in a single contiguous block. This layout does however impinge on some minor drainage lines within the site, which is a potential concern of the development. The drainage lines carry runoff very occasionally, only after large rainfall showers. Although there may be some vegetation within the bed of the drainage channel itself, there is no riparian vegetation along the banks of the drainage lines as they do not offer a significantly wetter habitat. According to the developer, the PV support structures can be built with minimal disturbance to the substrate and can be arranged to span the drainage lines. Provided that this is indeed the case then development over the channels would be acceptable. It is however important to recognise that the presence of the solar arrays would potentially generate a large amount of runoff, which could impact the drainage patterns of the site and increase the risk of erosion. Within the areas of deeper sands, the sandy soils have a very high infiltration capacity and runoff is likely to be low. However within the western parts of the development area, soils were much finer and shallow, with the result that runoff from these soils is likely to be quite high and particular attention to runoff regulation will need to be applied to this area. Overall, in terms of faunal habitats, the final layout is favourable for the majority of fauna as no highly sensitive faunal habitats will be affected. The final layout does however encompass a proportion of the area deemed suitable for the Red Lark

and so if this species occurs at the site, then it is likely that there will be some negative impact on this species.

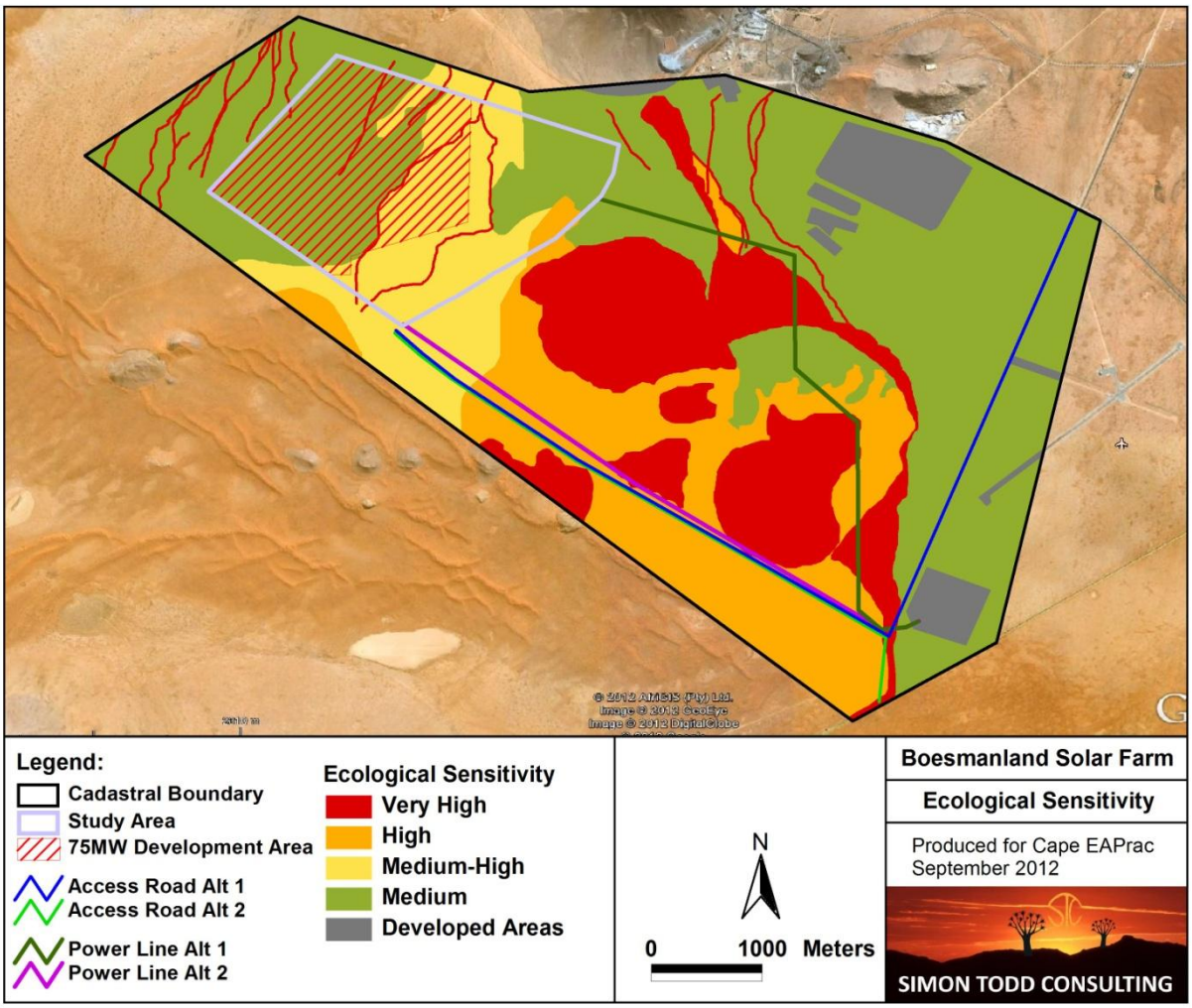


Figure 8. Ecological Sensitivity map of the proposed Boesmanland Solar Farm site. The development area falls largely within areas classified as Medium Sensitivity with some Medium-High Sensitivity area as well.

The various road and power line options are a little more complicated in terms of identifying the preferred options. In terms of the power line options, the southern route (Alternative 2) adjacent to the ESKOM power line is suggested as the preferred power line option. This area is however a CBA and specific precautions to reduce the impact of the power line on biodiversity should be implemented. Despite the fact that this area is a CBA, this is the preferred option as there is already a powerline present in this area and the other alternative crosses the lowlands near to the slimes dams and there is likely to be high avifaunal activity and the possibility of collision with the power line. In terms of the access road options, there is little difference between the options. However Access Road Alternative 1 is identified as the preferred option as there is already a gravel road present along this route from the tar Aggeneys access road to the ESKOM substation. Therefore only the common section from the substation to the site will need to be upgraded.

The impact assessment which follows is based on the preferred layout and any deviations from the layout as provided may invalidate the results of the assessment.

5 IMPACT ASSESSMENT

5.1 ASSESSMENT & SIGNIFICANCE CRITERIA

The assessment criteria used in the assessment are described below and are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as Brownlie (2005).

For each impact the following are described:

Nature of the impact. A description of positive or negative effect of the project on the affected environment, or *vice versa*. The description includes who or what would be affected, and how.

Extent of the impact. This includes assessing the spatial scale of the impact, i.e. is it local (within the boundaries of the study site), regional, national or international.

Duration of the impact. The lifespan of the impact is assessed, i.e. is it short term (0 - 5 years) Medium term (6 - 15 years) long term (where the impact will cease after the operational life of the proposed project) or permanent (the impact will persist beyond the operational life of the proposed project). Certain impacts can also be *discontinuous or intermittent* (where the impact may only occur during specific climatic conditions or during a particular season of the year).

Intensity or magnitude of the impact. The intensity or severity of the impact would be indicated as either Low (where the impact affects the environment in such a way that functioning and processes are not affected), Medium (i.e. where the affected environment is altered but functioning and processes continue albeit in a modified way) or High (i.e. where functioning and processes are altered to the extent that they will temporarily or permanently cease).

Probability of occurrence. The likelihood of the impact actually occurring would be indicated as either Improbable (the possibility of the impact materialising is very low as a result of design or historic experience), Probable (there is a distinct possibility that the impact will occur), Highly probable (it is most likely that the impact will occur), or Definite (the impact will occur regardless of the implementation of any prevention measures).

Significance of the impact. Based on a synthesis of the information contained in the criteria above, the potential impact would then be described according to following significance criteria:

- **No significance**: the impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.

- **Moderate significance**: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment and will result in the "no-go" option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

Confidence The level of confidence in predicting the impact can be described as low, where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving ecosystem, or inadequate information; medium, where there is a moderate level of confidence in the prediction; or high, where the impact can be predicted with a high level of confidence.

Cumulative Impact
Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Mitigation
The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on vegetation and animal habitats and to maximise re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potential impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested appropriately implemented.

5.2 IDENTIFICATION & NATURE OF IMPACTS

5.2.1 Impact Risk Factors

Potential ecological impacts resulting from the development would stem from a variety of different activities and risk factors associated with the construction and operational phases of the project including the following:

Construction Phase

- Vegetation clearing for PV panel supports, roads, buildings etc could impact listed plant species as well as high-biodiversity plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.
- Increased erosion risk would be highly likely to result due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems. Although the effects would probably only become apparent during the operational

phase, the impact stems from the construction phase and suitable mitigation measures will also need to be applied at this stage.

- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.

Operational Phase

- During operation the facility itself will operate with little noise and few staff. Nevertheless, the presence of the facility and occasional maintenance activities may deter some fauna from the area, amounting to a loss of connectivity & habitat fragmentation.
- Maintenance activities such as vegetation clearing will impact the biodiversity of the site if not conducted in a sensitive manner.

5.2.2 Identified Impacts

The above risk factors are likely to be manifested as the following impacts:

Impacts on vegetation and listed plant species

Some loss of vegetation is an inevitable consequence of the development and the potential impacts on listed plant species are concern given the high number of listed species which may occur at the site.

Increased Alien Plant Invasion Risk

Disturbance created at the site during construction would leave the site vulnerable to alien plant invasion. This decreases biodiversity of indigenous species as well as affect ecosystem function and hydrology in cases where species such as *Prosopis* reach dense levels of infestation.

Increased Erosion Risk

Increased erosion risk would result from soil disturbance and the loss of plant cover within cleared and disturbed areas. Although the site is not steep, the additional runoff generated by the panels and other cleared or hardened areas of the site would pose a risk if not properly managed. Regular monitoring to ensure that erosion problems are addressed would be required.

Direct and Indirect Faunal impacts

The construction of the facility will result in habitat loss for resident fauna, while increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals and reptiles

such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

Avifaunal impacts

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.

Loss of landscape connectivity and disruption of broad-scale ecological processes

The presence of the facility could potentially contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions. Depending on how the development is fenced off, the fencing would probably also restrict animal movement and disrupt the connectivity of the landscape for fauna which would no longer be able to pass through the area.

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 Boesmanland Solar Farm site and the likely extent of the development in the following section.

5.3 Assessment of Potential Impacts

The six major impacts identified above are assessed below, before and after mitigation as well as during the construction and operational phases of the project. The development is assessed as a whole and the different elements such as the roads, power lines and PV area are not assessed separately. Specific mitigation measures are however directed at the different elements of the development.

Potential Impact 1. Impacts on vegetation and listed plant species							
Extent	**Intensity**	**Duration**	**Probability**	**Confidence**	**Significance Without Mitigation**	**Mitigation**	**Significance With Mitigation**
Construction Phase							
Local	*High*	*Long term*	*Definite*	*High*	*Moderate-High (-tve)*	• 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 cannot be avoided specific mitigation measures to reduce their impact would need to be implemented. • Only those individuals of protected plant species directly within the development footprint should be cleared. • A search and rescue operation for protected species which could survive translocation such as *Hoodia* and *Aloe* should be conducted prior to construction. • Apart from within the PV area where the developer intends building over the drainage lines, drainage lines and other no-go areas should be demarcated at the site by an ecologist as part of the preconstruction activities for the site.	*Moderate-Low (-tve)*
Operational Phase							
Local	*Low*	*Long term*	*Definite*	*High*	*Low (-tve)*	• Any vegetation clearing that needs to take place as part of maintenance activities, should be done in an environmentally friendly manner, including avoiding the use of herbicides and using manual clearing methods wherever possible.	*Low (-tve)*
Residual Impacts:			Since the development would, by its nature, require some loss of vegetation, this impact cannot be fully mitigated and some loss of vegetation and impact on protected species is inevitable. Provided that measures are taken to minimise the impacts and post-construction risks, the overall residual would however be quite low.				
Cumulative Impacts:			In terms of cumulative impact, the mine and the current development probably contribute to the disruption of landscape connectivity for fauna as well as a relatively small loss of habitat. These impacts are however likely to operate a local level and would not be highly significant in terms of affecting broad scale ecological processes, given the fact that extensive tracts of intact habitat are available in the area.				

Potential Impact 2. Increased alien plant invasion risk							
Extent	**Intensity**	**Duration**	**Probability**	**Confidence**	**Significance & Status Without Mitigation**	**Mitigation**	**Significance & Status With Mitigation**
Construction Phase							
Local	*Medium*	*Long term*	*High*	*High*	*Moderate (-tve)*	• Soil disturbance and vegetation clearing should be kept to minimum. • Cleared areas that are not going to be used should be revegetated 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.	*Low (-tve)*
Operational Phase							
Local	*Medium*	*Long term*	*Moderate*	*High*	*Moderate (-tve)*	• All alien plants present at the site should be controlled at least 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.	*Low (-tve)*
Residual Impacts:		Provided that alien plants are effectively controlled there would be no residual impact.					
Cumulative Impacts:		Cumulative impacts relating to alien plants would only occur if alien plants are not controlled.					

Potential Impact 3. Increased wind and water erosion risk							
Extent	**Intensity**	**Duration**	**Probability**	**Confidence**	**Significance Without Mitigation**	**Mitigation**	**Significance With Mitigation**
Construction Phase							
Local	*Medium*	*Long term*	*Moderate*	*High*	*Moderat-High (-tve)*	• Particularly on the red sands of the site, precautions should be taken to avoid excessive disturbance and revegetation should take place as soon as possible after construction to avoid wind erosion. • 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 to redirect runoff and dissipate the energy of the water so as reduce erosion potential. • 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, encourage natural vegetation regeneration and limit erosion. • 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	*Low (-tve)*
Operational Phase							
Local	*Low*	*Long term*	*Low*	*High*	*Moderate (-tve)*	• 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. • All maintenance vehicles to remain on the demarcated roads.	*Low (-tve)*
Residual Impacts:		Provided that erosion is effectively controlled there would be no residual impact.					
Cumulative Impacts:		Cumulative impacts relating to erosion would only occur if alien plants are not controlled.					

Potential Impact 4: Direct and indirect faunal impacts							
Extent	**Intensity**	**Duration**	**Probability**	**Confidence**	**Significance & Status Without Mitigation**	**Mitigation**	**Significance & Status With Mitigation**
Construction Phase							
Local	*High*	*Short term*	*High*	*High*	*Moderate (-tve)*	• 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. The rocky outcrops are particularly sensitive in this regard and construction personnel should not be allowed off of the construction site and onto these areas. • All staff and contractors should undergo an environmental induction course by the ECO. • Fires should only be allowed within fire-safe demarcated areas. • No fuelwood 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. • 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, at least at strategic places, such as along drainage lines or other areas of dense vegetation. • 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.	*Moderate (-tve)*

Operational Phase							
Local	*Low*	*Long term*	*High*	*High*	*Low (-tve)*	• 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.	*Low (-tve)*
Residual Impacts:			Some habitat loss is an unavoidable consequence of the development, but would not be of high significance given the extensive tracts of intact similar habitat in the area.				
Cumulative Impacts:			There is another proposed PV facility in the area as well as the Black Mountain Mine itself which would contribute to cumulative impacts in the area. Although the current development would contribute to cumulative habitat loss in the area, the contribution would be relatively small and the impact restricted to the local area.				

Potental Impact 5 Negative impacts on avifauna as a result of habitat loss, electrocution and collisions with transmission lines							
Extent	**Intensity**	**Duration**	**Probability**	**Confidence**	**Significance & Status Without Mitigation**	**Mitigation**	**Significance & Status With Mitigation**
Construction Phase							
Local	*Moderate*	*Short term*	*High*	*High*	*Moderate (-tve)*	• 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.	*Moderate-Low (-tve)*
Operational Phase							
Local	*Low*	*Long term*	*High*	*High*	*Moderate (-tve)*	• Ensure that any maintenance on the transmission infrastructure of the site retains the bird-friendly design features. • 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.	*Low (-tve)*
Residual Impacts:		Some habitat loss is an unavoidable consequence of the development, but would not be of high significance given the extensive tracts of intact similar habitat in the area. Also, mitigation measures may not be entirely effective at eliminating collisions and electrocution, so some residual impact would remain.					
Cumulative Impacts:		The development would contribute to cumulative avifaunal impacts in the area resulting from electrocution and collisions.					

Potential Impact 6. Loss of landscape connectivity							
Extent	**Intensity**	**Duration**	**Probability**	**Confidence**	**Significance & Status Without Mitigation**	**Mitigation**	**Significance & Status With Mitigation**
Construction Phase							
Local	*Medium*	*Short term*	*High*	*High*	*Moderate (-tve)*	• Some fauna will avoid the site during construction as a result of the noise and human activity at the site and this is part of construction, it cannot be avoided during the construction phase	*Moderate (-tve)*
Operational Phase							
Local	*Medium*	*Long term*	*Moderate*	*Moderate*	*Moderate (-tve)*	• Only the facility itself should be fenced-off. • The minimum amount of lighting should be used at night and this should be of the low-UV emitting kind that attracts less insects.	*Moderate-Low (-tve)*
Residual Impacts:			The presence of the facility will be the cause of a large proportion of the impact and so the residual impact is quite high and will persist for the life of the facility.				
Cumulative Impacts:			The facility will contribute a relatively small amount to the cumulative loss of habitat and a reduction in landscape connectivity in the area.				

Summary Assessment

A summary assessment of the above potential impacts is provided below with reference to the different phases of the project (construction & operation) as well as pre- and post-mitigation. The construction phase of the project will create a lot of disturbance at the site, which will leave the site vulnerable to wind and water erosion, as well as result in habitat loss for fauna. Wind erosion is highlighted as a potential significant concern in the areas of red sands, which are currently stabilized, but could become mobilized if the vegetation is disturbed. In terms of flora, the site was not highly sensitive and the only species of conservation concern observed at the site was *Hoodia gordonii*, which is protected but is not rare or threatened. The specimens within the development footprint would need to be transplanted to a similar area on site but outside the development footprint. There were also a number of other provincially protected species present that would need to be translocated prior to construction.

Faunal disturbance during the construction phase is inevitable and cannot be fully mitigated. The impact is however restricted to the construction phase and fauna are likely to return to the area during the operational phase of the project. Given the relatively large number of listed bird species which occur in the area, including the narrow endemic Red Lark *Calendulauda burra*, the potential impacts of the development on avifauna are quite high. However, the risk to larger avifauna can be mitigated by fitting bird flappers to the new lines as well as insulating the live components in the high-risk areas. The potential impacts on the Red Lark are a potential concern, but the extent of the development is small in comparison to the range of this species, the resultant habitat loss would not be of high overall significance for this species.

Table 3. Summary assessment of the pre- and post-mitigation impacts associated with the construction and operation phases of the project

Impact	Project Phase	Pre Mitigation	Post Mitigation
Impacts on vegetation and protected plant species	Construction	Moderate-High	Moderate-Low
	Operation	Low	Low
Increased alien plant invasion risk	Construction	Moderate	Low
	Operation	Moderate	Low
Increased erosion risk	Construction	Moderate-High	Low
	Operation	Moderate	Low
Faunal habitat loss and disturbance	Construction	Moderate	Moderate
	Operation	Low	Low
Negative impacts on avifauna	Construction	Moderate	Moderate-Low
	Operation	Moderate	Low
Loss of landscape connectivity	Construction	Moderate	Moderate
	Operation	Moderate	Moderate-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 is another solar facility planned near to the ESKOM substation and the Black Mountain Mine and the town of Aggeneys also represents a source of disturbance and habitat loss, which when combined with the current proposed development would result in some cumulative impact. However, when taken in context of the broader landscape, the cumulative impacts are not likely to be highly significant given the extensive intact nature of the landscape as a whole.

6 CONCLUSION & RECOMMENDATIONS

In terms of local-level biodiversity, the site is not exceptional and the site is not highly sensitive in this regard, as there are no unique, threatened of otherwise unique habitats present which are not widely available in the wider landscape. As a result the majority of impacts associated with the development of the site are likely to be local in nature and not of wider significance. The major impacts or risk factors likely to be associated with the development include erosion resulting from all the disturbance at the site and potentially the additional runoff generated by the panels and other hardened surfaces at the site, as well as the loss of habitat for species such as Red Lark. The majority of the site is however quite flat and risk of erosion therefore likely to be quite low as the erosive power of the runoff is not likely to be very high. Although there are a number of nationally or provincially protected species at the site, none of these are rare and the loss of the affected individuals from the development footprint would not be of wider significance or compromise the viability of the local populations of these species.

Given the site constraints, the final layout location of the PV area is seen as a favourable choice and should serve to minimise the negative impacts of this element of the development. In terms of the access roads, the Access Road Alternative 1 is seen as the preferred option as there is already a road of sufficient capacity present from the ESKOM substation to the public road. In terms of the power line options, Alternative 2 which aligns with the existing ESKOM power line along the southern boundary of the site is seen as the preferred option.

Provided that reasonable mitigation measures to reduce erosion and the other ecological impacts of the development are implanted, then the development of the site as a solar energy facility is not likely to result in long-term degradation of the receiving environment or significant net loss of biodiversity.

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8 ANNEX 1. LIST OF PLANTS

Checklist of plant species that were recorded during the site visit as well as those species known from the general are according to the SANBI SIBIS database (Accessed & records downloaded 10 February 2012). It is important to note that only the observed species can be confirmed as occurring within the site and even this list includes a lot of species that will not occur within the final development footprint.

Family	Species	Observed	Family	Species	Observed
Acanthaceae	*Acanthopsis hoffmannseggiana*	1	Fabaceae	*Hoffmannseggia lactea*	1
Acanthaceae	*Barleria rigida*		Funariaceae	*Funaria clavata*	
Acanthaceae	*Barleria sp.*		Funariaceae	*Goniomitrium africanum*	
Acanthaceae	*Blepharis capensis*	1	Geraniaceae	*Monsonia parvifolia*	
Acanthaceae	*Blepharis mitrata*	1	Geraniaceae	*Pelargonium adriaanii*	
Acanthaceae	*Blepharis sp.*		Geraniaceae	*Pelargonium carnosum subsp. Carnosum*	
Acanthaceae	*Justicia thymifolia*		Geraniaceae	*Pelargonium crithmifolium*	
Acanthaceae	*Monechma incanum*	1	Geraniaceae	*Pelargonium spinosum*	
Acanthaceae	*Monechma saxatile*		Geraniaceae	*Pelargonium xerophyton*	
Acanthaceae	*Monechma spartioides*	1	Geraniaceae	*Sarcocaulon ciliatum*	
Acanthaceae	*Petalidium setosum*		Geraniaceae	*Sarcocaulon crassicaule*	1
Aizoaceae	*Aizoon asbestinum*		Gigaspermaceae	*Chamaebryum pottioides*	
Aizoaceae	*Aizoon canariense*		Gisekiaceae	*Gisekia africana var. africana*	
Aizoaceae	*Galenia africana*	1	Gisekiaceae	*Gisekia pharnacioides var. pharnacioides*	
Aizoaceae	*Galenia crystallina var. crystallina*		Hyacinthaceae	*Albuca namaquensis*	
Aizoaceae	*Galenia fruticosa*		Hyacinthaceae	*Albuca setosa*	
Aizoaceae	*Galenia papulosa*		Hyacinthaceae	*Albuca spiralis*	
Aizoaceae	*Galenia sarcophylla*		Hyacinthaceae	*Bowiea gariepensis*	
Aizoaceae	*Tetragonia acanthocarpa*		Hyacinthaceae	*Bowiea volubilis subsp. Gariepensis*	
Aizoaceae	*Tetragonia arbuscula*	1	Hyacinthaceae	*Dipcadi ciliare*	
Aizoaceae	*Tetragonia reduplicata*		Hyacinthaceae	*Drimia intricate*	
Aizoaceae	*Trianthema parvifolia*	1	Hyacinthaceae	*Lachenalia giessii*	
Aizoaceae	*Trianthema parvifolia var. parvifolia*		Hyacinthaceae	*Lachenalia polypodantha*	
Aizoaceae	*Trianthema parvifolia var. rubens*		Hyacinthaceae	*Lachenalia sp.*	
Aizoaceae	*Mesembryanthemum latipetalum*		Hyacinthaceae	*Lachenalia undulate*	
Aizoaceae	*Mesembryanthemum lignescens*		Hyacinthaceae	*Ledebouria cooperi*	1
Aizoaceae	*Mesembryanthemum schenckii*		Hyacinthaceae	*Ledebouria undulate*	
Aizoaceae	*Schwantesia rüdebuschii*		Hyacinthaceae	*Massonia bifolia*	
Amaranthaceae	*Amaranthus capensis subsp. capensis*		Hyacinthaceae	*Ornithogalum glandulosum*	
Amaranthaceae	*Amaranthus praetermissus*		Hyacinthaceae	*Ornithogalum pruinosum*	
Amaranthaceae	*Amaranthus thunbergii*		Hyacinthaceae	*Ornithogalum subcoriaceum*	
Amaranthaceae	*Calicorema capitata*		Hyacinthaceae	*Ornithogalum stapffii*	1
Amaranthaceae	*Hermbstaedtia glauca*	1	Hyacinthaceae	*Whiteheadia bifolia*	
Amaranthaceae	*Sericocoma avolans*	1	Hypoxidaceae	*Empodium sp.*	
Amaranthaceae	*Sericocoma pungens*		Hypoxidaceae	*Spiloxene scullyi*	

Amaryllidaceae	*Brunsvigia bosmaniae*	
Amaryllidaceae	*Brunsvigia comptonii*	
Amaryllidaceae	*Brunsvigia herrei*	
Amaryllidaceae	*Brunsvigia namaquana*	
Amaryllidaceae	*Brunsvigia sp.*	
Amaryllidaceae	*Haemanthus coccineus*	
Amaryllidaceae	*Haemanthus sp.*	
Amaryllidaceae	*Hessea speciosa*	
Amaryllidaceae	*Hessea stenosiphon*	
Anacardiaceae	*Ozoroa dispar*	
Anacardiaceae	*Rhus burchellii*	
Anacardiaceae	*Searsia burchellii*	
Anacardiaceae	*Searsia populifolia*	
Apiaceae	*Anginon jaarsveldii*	
Apocynaceae	*Ectadium virgatum*	
Apocynaceae	*Gomphocarpus filiformis*	
Apocynaceae	*Hoodia alstonii*	
Apocynaceae	*Hoodia gordonii*	1
Apocynaceae	*Huernia clavigera*	
Apocynaceae	*Microloma incanum*	
Apocynaceae	*Microloma sagittatum*	
Apocynaceae	*Pachypodium namaquanum*	
Apocynaceae	*Sarcostemma pearsonii*	
Apocynaceae	*Sarcostemma viminale subsp. thunbergii*	
Apocynaceae	*Sarcostemma viminale subsp. viminale*	
Apocynaceae	*Stapelia similis*	
Asparagaceae	*Asparagus asparagoides*	1
Asparagaceae	*Asparagus ovatus*	
Asparagaceae	*Asparagus retrofractus*	1
Asphodelaceae	*Aloe dabenorisana*	
Asphodelaceae	*Bulbine ophiophylla*	
Asphodelaceae	*Bulbine striata*	
Asphodelaceae	*Haworthia venosa subsp. tessellata*	
Asphodelaceae	*Trachyandra divaricata*	
Asphodelaceae	*Trachyandra jacquiniana*	
Asphodelaceae	*Trachyandra laxa var. laxa*	
Aspleniaceae	*Asplenium cordatum*	
Asteraceae	*Amphiglossa tomentosa*	
Asteraceae	*Anisopappus pinnatifidus*	
Asteraceae	*Arctotis hirsuta*	
Asteraceae	*Arctotis leiocarpa*	
Asteraceae	*Arctotis leiocarpa Harv. x A. fastuosa Jacq.*	
Asteraceae	*Arctotis venusta*	
Asteraceae	*Berkheya canescens*	
Iridaceae	*Ferraria variabilis*	
Iridaceae	*Gladiolus orchidiflorus*	
Iridaceae	*Gladiolus saccatus*	
Iridaceae	*Gladiolus sp.*	
Iridaceae	*Hesperantha rupicola*	
Iridaceae	*Lapeirousia littoralis subsp. Littoralis*	
Iridaceae	*Lapeirousia plicata subsp. Plicata*	
Iridaceae	*Moraea unguiculata*	
Iridaceae	*Tritonia karooica*	
Juncaceae	*Juncus rigidus*	
Lamiaceae	*Acrotome pallescens*	
Lamiaceae	*Salvia garipensis*	
Lamiaceae	*Stachys flavescens*	
Lamiaceae	*Stachys linearis*	
Lamiaceae	*Stachys rugosa*	
Loasaceae	*Kissenia capensis*	
Lophiocarpaceae	*Lophiocarpus polystachyus*	1
Loranthaceae	*Septulina glauca*	
Malvaceae	*Abutilon pycnodon*	
Malvaceae	*Hermannia abrotanoides*	
Malvaceae	*Hermannia affinis*	1
Malvaceae	*Hermannia burchellii*	
Malvaceae	*Hermannia cernua*	
Malvaceae	*Hermannia confuse*	
Malvaceae	*Hermannia disermifolia*	
Malvaceae	*Hermannia gariepina*	
Malvaceae	*Hermannia grandiflora*	
Malvaceae	*Hermannia minutiflora*	
Malvaceae	*Hermannia sp.*	
Malvaceae	*Hermannia spinosa*	1
Malvaceae	*Hermannia stricta*	1
Malvaceae	*Hermannia tomentosa*	1
Malvaceae	*Hibiscus elliottiae*	
Melianthaceae	*Melianthus comosus*	
Menispermaceae	*Antizoma miersiana*	
Mesembryanthemaceae	*Amphibolia rupis-arcuatae*	
Mesembryanthemaceae	*Antimima nordenstamii*	
Mesembryanthemaceae	*Antimima tuberculosa*	
Mesembryanthemaceae	*Antimima vanzylii*	
Mesembryanthemaceae	*Arenifera stylosa*	
Mesembryanthemaceae	*Aridaria noctiflora subsp. Straminea*	1
Mesembryanthemaceae	*Aspazoma amplectens*	
Mesembryanthemaceae	*Brownanthus arenosus*	
Mesembryanthemaceae	*Brownanthus ciliatus subsp.*	

Asteraceae	*Berkheya fruticosa*	
Asteraceae	*Berkheya spinosissima subsp. namaensis var. namaensis*	
Asteraceae	*Berkheya spinosissima subsp. spinosissima*	1
Asteraceae	*Chrysocoma longifolia*	
Asteraceae	*Chrysocoma microphylla*	
Asteraceae	*Chrysocoma sparsifolia*	
Asteraceae	*Cineraria canescens var. canescens*	
Asteraceae	*Dicoma capensis*	1
Asteraceae	*Dimorphotheca polyptera*	
Asteraceae	*Dimorphotheca sinuata*	
Asteraceae	*Doellia cafra*	
Asteraceae	*Eriocephalus africanus*	1
Asteraceae	*Eriocephalus merxmuelleri*	
Asteraceae	*Eriocephalus microphyllus var. pubescens*	
Asteraceae	*Eriocephalus scariosus*	
Asteraceae	*Eriocephalus spinescens*	1
Asteraceae	*Euryops subcarnosus subsp. vulgaris*	
Asteraceae	*Felicia clavipilosa*	1
Asteraceae	*Felicia hirsuta*	
Asteraceae	*Felicia muricata*	
Asteraceae	*Felicia muricata subsp. cinerascens*	
Asteraceae	*Felicia muricata subsp. muricata*	
Asteraceae	*Felicia namaquana*	
Asteraceae	*Felicia sp.*	
Asteraceae	*Foveolina albida*	
Asteraceae	*Foveolina dichotoma*	
Asteraceae	*Gazania lichtensteinii*	
Asteraceae	*Geigeria pectidea*	
Asteraceae	*Geigeria vigintisquamea*	
Asteraceae	*Gorteria corymbosa*	
Asteraceae	*Gymnodiscus linearifolia*	
Asteraceae	*Helichrysum gariepinum*	
Asteraceae	*Helichrysum herniarioides*	
Asteraceae	*Helichrysum micropoides*	
Asteraceae	*Helichrysum pulchellum*	
Asteraceae	*Helichrysum pumilio*	1
Asteraceae	*Helichrysum zeyheri*	
Asteraceae	*Hirpicium alienatum*	
Asteraceae	*Hirpicium echinus*	
Asteraceae	*Hirpicium integrifolium*	
Asteraceae	*Ifloga molluginoides*	
	Schenkii	
Mesembryanthemaceae	*Brownanthus nucifer*	
Mesembryanthemaceae	*Brownanthus schenckii*	
Mesembryanthemaceae	*Cephalophyllum fulleri*	
Mesembryanthemaceae	*Cephalophyllum parvibracteatum*	
Mesembryanthemaceae	*Cephalophyllum staminodiosum*	
Mesembryanthemaceae	*Cheiridopsis denticulata*	
Mesembryanthemaceae	*Cheiridopsis sp.*	
Mesembryanthemaceae	*Conicosia elongate*	
Mesembryanthemaceae	*Conophytum achabense*	
Mesembryanthemaceae	*Conophytum burger*	
Mesembryanthemaceae	*Conophytum calculus subsp. Vanzylii*	
Mesembryanthemaceae	*Conophytum ectypum subsp. Ectypum*	
Mesembryanthemaceae	*Conophytum fuller*	
Mesembryanthemaceae	*Conophytum limpidum*	1
Mesembryanthemaceae	*Conophytum marginatum var. haramoepense*	
Mesembryanthemaceae	*Conophytum maughanii subsp. Maughanii*	
Mesembryanthemaceae	*Conophytum praesectum*	
Mesembryanthemaceae	*Conophytum rarum*	
Mesembryanthemaceae	*Conophytum ratum*	
Mesembryanthemaceae	*Conophytum sp.*	
Mesembryanthemaceae	*Conophytum subfenestratum*	
Mesembryanthemaceae	*Dinteranthus microspermus subsp. Puberulus*	
Mesembryanthemaceae	*Dinteranthus puberulus*	
Mesembryanthemaceae	*Dorotheanthus bellidiformis subsp. hestermalensis*	
Mesembryanthemaceae	*Drosanthemum albens*	
Mesembryanthemaceae	*Drosanthemum diversifolium*	
Mesembryanthemaceae	*Drosanthemum godmaniae*	
Mesembryanthemaceae	*Drosanthemum hispidum*	
Mesembryanthemaceae	*Drosanthemum karrooense*	1
Mesembryanthemaceae	*Drosanthemum luederitzii*	
Mesembryanthemaceae	*Drosanthemum schoenlandianum*	1
Mesembryanthemaceae	*Drosanthemum sp.*	
Mesembryanthemaceae	*Ebracteola fuller*	
Mesembryanthemaceae	*Hereroa hesperantha*	
Mesembryanthemaceae	*Hereroa pallens*	
Mesembryanthemaceae	*Ihlenfeldtia excavate*	
Mesembryanthemaceae	*Ihlenfeldtia vanzylii*	
Mesembryanthemaceae	*Lapidaria margaretae*	
Mesembryanthemaceae	*Leipoldtia pauciflora*	
Mesembryanthemaceae	*Lithops dinteri subsp. frederici*	
Mesembryanthemaceae	*Lithops julii subsp. fulleri*	

Asteraceae	*Kleinia cephalophora*	
Asteraceae	*Kleinia longiflora*	1
Asteraceae	*Lopholaena cneorifolia*	
Asteraceae	*Nidorella resedifolia subsp. resedifolia*	
Asteraceae	*Oncosiphon piluliferum*	
Asteraceae	*Osteospermum armatum*	
Asteraceae	*Osteospermum karrooicum*	
Asteraceae	*Osteospermum muricatum subsp. longiradiatum*	
Asteraceae	*Osteospermum muricatum subsp. muricatum*	
Asteraceae	*Osteospermum pinnatum var. pinnatum*	
Asteraceae	*Othonna abrotanifolia*	
Asteraceae	*Othonna arbuscula*	
Asteraceae	*Othonna furcata*	
Asteraceae	*Othonna quercifolia*	
Asteraceae	*Othonna sedifolia*	
Asteraceae	*Pegolettia retrofracta*	
Asteraceae	*Pentatrichia petrosa*	
Asteraceae	*Pentzia argentea*	
Asteraceae	*Pentzia lanata*	
Asteraceae	*Pentzia pinnatisecta*	
Asteraceae	*Pteronia glabrata*	
Asteraceae	*Pteronia glauca*	
Asteraceae	*Pteronia lucilioides*	
Asteraceae	*Pteronia mucronata*	1
Asteraceae	*Pteronia scariosa*	
Asteraceae	*Pteronia unguiculata*	
Asteraceae	*Rosenia humilis*	
Asteraceae	*Senecio bulbinifolius*	
Asteraceae	*Senecio eenii*	
Asteraceae	*Senecio flavus*	
Asteraceae	*Senecio niveus*	1
Asteraceae	*Senecio pinguifolius*	
Asteraceae	*Senecio piptocoma*	
Asteraceae	*Senecio sarcoides*	
Asteraceae	*Senecio sisymbriifolius*	
Asteraceae	*Tripteris microcarpa subsp. microcarpa*	
Asteraceae	*Tripteris sinuata var. linearis*	
Asteraceae	*Tripteris sinuata var. sinuata*	1
Asteraceae	*Ursinia nana subsp. nana*	
Asteraceae	*Ursinia speciosa*	
Asteraceae	*Vernonia cinerascens*	
Asteraceae	*Vernonia obionifolia subsp. obionifolia*	
Mesembryanthemaceae	*Lithops olivacea*	
Mesembryanthemaceae	*Lithops olivacea var. nebrownii*	
Mesembryanthemaceae	*Malephora lutea*	
Mesembryanthemaceae	*Mesembryanthemum crystallinum*	
Mesembryanthemaceae	*Mesembryanthemum guerichianum*	
Mesembryanthemaceae	*Mesembryanthemum inachabense*	
Mesembryanthemaceae	*Mesembryanthemum sp.*	
Mesembryanthemaceae	*Mesembryanthemum subnodosum*	
Mesembryanthemaceae	*Phyllobolus latipetalus*	
Mesembryanthemaceae	*Phyllobolus lignescens*	
Mesembryanthemaceae	*Phyllobolus nitidus*	
Mesembryanthemaceae	*Prenia tetragona*	
Mesembryanthemaceae	*Psilocaulon articulatum*	
Mesembryanthemaceae	*Psilocaulon coriarium*	1
Mesembryanthemaceae	*Psilocaulon sp.*	
Mesembryanthemaceae	*Psilocaulon subnodosum*	
Mesembryanthemaceae	*Ruschia axthelmiana*	
Mesembryanthemaceae	*Ruschia centrocapsula*	
Mesembryanthemaceae	*Ruschia cradockensis subsp. Triticiformis*	
Mesembryanthemaceae	*Ruschia divaricate*	
Mesembryanthemaceae	*Ruschia ferox*	1
Mesembryanthemaceae	*Ruschia muricata*	
Mesembryanthemaceae	*Ruschia robusta*	
Mesembryanthemaceae	*Ruschia sp.*	
Mesembryanthemaceae	*Ruschia spinosa*	
Mesembryanthemaceae	*Ruschia vulvaria*	
Mesembryanthemaceae	*Schwantesia marlothii*	
Mesembryanthemaceae	*Schwantesia ruedebuschii*	
Mesembryanthemaceae	*Schwantesia sp.*	
Mesembryanthemaceae	*Schwantesia triebneri*	
Mesembryanthemaceae	*Stomatium fuller*	
Mesembryanthemaceae	*Titanopsis hugo-schlechteri*	
Mesembryanthemaceae	*Trichodiadema littlewoodii*	
Mesembryanthemaceae	*Trichodiadema obliquum*	
Mesembryanthemaceae	*Trichodiadema setuliferum*	
Mesembryanthemaceae	*Trichodiadema sp.*	
Molluginaceae	*Hypertelis salsoloides*	1
Molluginaceae	*Hypertelis salsoloides var. salsoloides*	
Molluginaceae	*Limeum aethiopicum subsp. aethiopicum var. aethiopicum*	1
Molluginaceae	*Limeum arenicolum*	
Molluginaceae	*Limeum myosotis var. myosotis*	
Molluginaceae	*Limeum sulcatum var. gracile*	

Asteraceae	*Arctotis dimorphocarpa*	
Asteraceae	*Othonna daucifolia*	
Aytoniaceae	*Plagiochasma rupestre var. rupestre*	
Bartramiaceae	*Philonotis dregeana*	
Bignoniaceae	*Rhigozum trichotomum*	1
Boraginaceae	*Codon royenii*	1
Boraginaceae	*Ehretia rigida subsp. rigida*	
Boraginaceae	*Heliotropium ciliatum*	1
Boraginaceae	*Heliotropium tubulosum*	
Boraginaceae	*Trichodesma africanum*	1
Boraginaceae	*Wellstedia dinteri subsp. dinteri*	
Brassicaceae	*Coronopus integrifolius*	
Brassicaceae	*Heliophila carnosa*	
Brassicaceae	*Heliophila deserticola var. deserticola*	
Brassicaceae	*Heliophila deserticola var. micrantha*	
Brassicaceae	*Heliophila lactea*	
Brassicaceae	*Heliophila trifurca*	
Brassicaceae	*Lepidium trifurcum*	
Bryaceae	*Bryum argenteum*	
Burseraceae	*Commiphora gracilifrondosa*	
Burseraceae	*Commiphora kraeuseliana*	
Campanulaceae	*Wahlenbergia annularis*	
Campanulaceae	*Wahlenbergia divergens*	
Campanulaceae	*Wahlenbergia meyeri*	
Campanulaceae	*Wahlenbergia prostrata*	
Capparaceae	*Boscia foetida subsp. foetida*	1
Capparaceae	*Cleome angustifolia subsp. diandra*	
Capparaceae	*Cleome foliosa var. lutea*	
Capparaceae	*Cleome oxyphylla var. oxyphylla*	
Capparaceae	*Cleome paxii*	
Caryophyllaceae	*Dianthus micropetalus*	
Caryophyllaceae	*Dianthus namaensis*	
Caryophyllaceae	*Dianthus namaensis var. dinteri*	
Celastraceae	*Gymnosporia heterophylla*	
Chenopodiaceae	*Salsola aphylla*	1
Chenopodiaceae	*Salsola barbata*	
Chenopodiaceae	*Salsola columnaris*	
Chenopodiaceae	*Salsola kalaharica*	1
Chenopodiaceae	*Salsola rabieana*	1
Chenopodiaceae	*Salsola namibica*	1
Chenopodiaceae	*Salsola tuberculata*	
Colchicaceae	*Ornithoglossum dinteri*	
Colchicaceae	*Ornithoglossum viride*	
Molluginaceae	*Mollugo cerviana var. cerviana*	
Molluginaceae	*Pharnaceum croceum*	
Molluginaceae	*Pharnaceum sp.*	
Molluginaceae	*Pharnaceum viride*	
Molluginaceae	*Suessenguthiella scleranthoides*	
Montiniaceae	*Montinia caryophyllacea*	1
Montiniaceae	*Montinia sp.*	
Moraceae	*Ficus cordata subsp. cordata*	
Moraceae	*Ficus ilicina*	
Neuradaceae	*Grielum humifusum var. humifusum*	
Neuradaceae	*Grielum sinuatum*	
Ophioglossaceae	*Ophioglossum sp.*	
Orobanchaceae	*Hyobanche rubra*	
Oxalidaceae	*Oxalis annae*	
Oxalidaceae	*Oxalis pes-caprae var. pes-caprae*	
Oxalidaceae	*Oxalis sp.*	
Passifloraceae	*Adenia repanda*	
Pedaliaceae	*Rogeria longiflora*	1
Plumbaginaceae	*Dyerophytum africanum*	
Poaceae	*Aristida adscensionis*	1
Poaceae	*Aristida congesta subsp. Barbicollis*	
Poaceae	*Aristida congesta subsp. Congesta*	
Poaceae	*Aristida engleri var. engleri*	
Poaceae	*Brachiaria glomerata*	
Poaceae	*Cenchrus ciliaris*	
Poaceae	*Cladoraphis spinescens*	1
Poaceae	*Danthoniopsis ramosa*	
Poaceae	*Digitaria eriantha*	
Poaceae	*Ehrharta calycina*	
Poaceae	*Ehrharta pusilla*	
Poaceae	*Enneapogon cenchroides*	
Poaceae	*Enneapogon desvauxii*	1
Poaceae	*Enneapogon scaber*	1
Poaceae	*Eragrostis homomalla*	
Poaceae	*Eragrostis nindensis*	
Poaceae	*Eragrostis procumbens*	
Poaceae	*Eragrostis rotifer*	
Poaceae	*Leucophrys mesocoma*	1
Poaceae	*Melinis repens subsp. Grandiflora*	
Poaceae	*Oropetium capense*	1
Poaceae	*Panicum arbusculum*	
Poaceae	*Schismus barbatus*	
Poaceae	*Schmidtia kalahariensis*	

Colchicaceae	*Ornithoglossum vulgare*	
Convolvulaceae	*Convolvulus sagittatus*	
Crassulaceae	*Adromischus diabolicus*	
Crassulaceae	*Adromischus nanus*	
Crassulaceae	*Adromischus schuldtianus subsp. schuldtianus*	
Crassulaceae	*Adromischus trigynus*	
Crassulaceae	*Cotyledon orbiculata var. orbiculata*	
Crassulaceae	*Crassula brevifolia subsp. brevifolia*	
Crassulaceae	*Crassula campestris*	
Crassulaceae	*Crassula corallina subsp. macrorrhiza*	1
Crassulaceae	*Crassula cotyledonis*	
Crassulaceae	*Crassula deltoidea*	
Crassulaceae	*Crassula exilis subsp. exilis*	
Crassulaceae	*Crassula exilis subsp. sedifolia*	
Crassulaceae	*Crassula garibina*	
Crassulaceae	*Crassula garibina subsp. garibina*	
Crassulaceae	*Crassula macowaniana*	
Crassulaceae	*Crassula muscosa var. muscosa*	
Crassulaceae	*Crassula sericea var. hottentotta*	
Crassulaceae	*Crassula sericea var. sericea*	
Crassulaceae	*Crassula sericea var. velutina*	
Crassulaceae	*Crassula subaphylla var. subaphylla*	
Crassulaceae	*Crassula tabularis*	
Crassulaceae	*Crassula tenuipedicellata*	
Crassulaceae	*Crassula tomentosa var. glabrifolia*	
Crassulaceae	*Tylecodon reticulatus*	
Crassulaceae	*Tylecodon reticulatus subsp. phyllopodium*	
Crassulaceae	*Tylecodon reticulatus subsp. reticulatus*	
Crassulaceae	*Tylecodon rubrovenosus*	
Crassulaceae	*Tylecodon sulphureus*	
Crassulaceae	*Tylecodon sulphureus var. armianus*	
Crassulaceae	*Tylecodon sulphureus var. sulphureus*	
Cucurbitaceae	*Cucumis africanus*	
Cucurbitaceae	*Cucumis rigidus*	
Cucurbitaceae	*Trochomeria debilis*	
Cyperaceae	*Cyperus marginatus*	
Cyperaceae	*Isolepis hemiuncialis*	
Ebenaceae	*Diospyros acocksii*	
Ebenaceae	*Diospyros ramulosa*	
Poaceae	*Schmidtia pappophoroides*	
Poaceae	*Sporobolus nervosus*	
Poaceae	*Stipagrostis brevifolia*	1
Poaceae	*Stipagrostis ciliata var. capensis*	1
Poaceae	*Stipagrostis hochstetteriana var. hochstetteriana*	
Poaceae	*Stipagrostis hochstetteriana var. secalina*	
Poaceae	*Stipagrostis namaquensis*	1
Poaceae	*Stipagrostis obtuse*	1
Poaceae	*Stipagrostis uniplumis var. uniplumis*	1
Poaceae	*Tragus berteronianus*	
Poaceae	*Tricholaena capensis subsp. Arenaria*	
Poaceae	*Tricholaena capensis subsp. Capensis*	
Poaceae	*Triraphis ramosissima*	
Polygalaceae	*Polygala leptophylla*	
Polygalaceae	*Polygala leptophylla var. armata*	
Polygalaceae	*Polygala seminude*	1
Portulacaceae	*Anacampseros baeseckei*	
Portulacaceae	*Anacampseros filamentosa subsp. Namaquensis*	
Portulacaceae	*Anacampseros papyracea subsp. Namaensis*	
Portulacaceae	*Avonia albissima*	1
Portulacaceae	*Avonia dinteri*	
Portulacaceae	*Avonia herreana*	
Portulacaceae	*Avonia papyracea subsp. Namaensis*	
Portulacaceae	*Avonia papyracea subsp. Papyracea*	
Portulacaceae	*Avonia quinaria subsp. alstonii*	
Portulacaceae	*Avonia recurvata subsp. minuta*	
Portulacaceae	*Avonia recurvata subsp. Recurvate*	
Portulacaceae	*Ceraria fruticulosa*	
Portulacaceae	*Ceraria namaquensis*	
Portulacaceae	*Portulaca kermesina*	
Pottiaceae	*Pseudocrossidium crinitum*	
Pottiaceae	*Syntrichia ammonsiana*	
Pottiaceae	*Tortula atrovirens*	
Pottiaceae	*Trichostomum brachydontium*	
Pteridaceae	*Cheilanthes deltoidea*	
Ptychomitriaceae	*Ptychomitriopsis aloinoides*	
Rubiaceae	*Anthospermum spathulatum subsp. Spathulatum*	
Rubiaceae	*Kohautia caespitosa subsp. Brachyloba*	
Rubiaceae	*Kohautia cynanchica*	

Ebenaceae	*Euclea pseudebenus*	
Ebenaceae	*Euclea undulata*	
Eriospermaceae	*Eriospermum bakerianum subsp. bakerianum*	
Eriospermaceae	*Eriospermum ernstii*	
Eriospermaceae	*Eriospermum pusillum*	
Euphorbiaceae	*Euphorbia dregeana*	
Euphorbiaceae	*Euphorbia gariepina subsp. balsamea*	
Euphorbiaceae	*Euphorbia gariepina subsp. gariepina*	1
Euphorbiaceae	*Euphorbia gregaria*	
Euphorbiaceae	*Euphorbia gummifera*	
Euphorbiaceae	*Euphorbia inaequilatera var. inaequilatera*	
Euphorbiaceae	*Euphorbia lignosa*	1
Euphorbiaceae	*Euphorbia mauritanica var. corallothamnus*	
Euphorbiaceae	*Euphorbia mauritanica var. mauritanica*	
Euphorbiaceae	*Euphorbia multiceps*	1
Euphorbiaceae	*Euphorbia rudis*	1
Euphorbiaceae	*Euphorbia spinea*	1
Euphorbiaceae	*Jatropha orangeana*	
Fabaceae	*Acacia erioloba*	
Fabaceae	*Acacia mellifera subsp. detinens*	
Fabaceae	*Adenolobus garipensis*	
Fabaceae	*Crotalaria virgultalis*	1
Fabaceae	*Indigastrum argyraeum*	
Fabaceae	*Indigastrum argyroides*	
Fabaceae	*Indigofera heterotricha*	
Fabaceae	*Indigofera pechuelii*	1
Fabaceae	*Indigofera pungens*	1
Fabaceae	*Indigofera sessilifolia*	
Fabaceae	*Indigofera sordida*	
Fabaceae	*Lebeckia spinescens*	1
Fabaceae	*Leobordea platycarpa*	
Fabaceae	*Lessertia depressa*	
Fabaceae	*Lessertia sp.*	
Fabaceae	*Lotononis fruticoides*	
Fabaceae	*Lotononis parviflora*	
Fabaceae	*Lotononis rabenaviana*	
Fabaceae	*Melolobium candicans*	
Fabaceae	*Melolobium microphyllum*	1
Fabaceae	*Parkinsonia africana*	1
Fabaceae	*Pomaria lactea*	
Fabaceae	*Prosopis glandulosa var. glandulosa*	1
Fabaceae	*Prosopis sp.*	
Fabaceae	*Prosopis velutina*	
Rubiaceae	*Nenax cinerea*	
Santalaceae	*Thesium hystricoides*	
Santalaceae	*Thesium lineatum*	1
Sapindaceae	*Pappea capensis*	1
Scrophulariaceae	*Antherothamnus pearsonii*	
Scrophulariaceae	*Anticharis juncea*	
Scrophulariaceae	*Aptosimum junceum*	
Scrophulariaceae	*Aptosimum marlothii*	
Scrophulariaceae	*Aptosimum procumbens*	
Scrophulariaceae	*Aptosimum spinescens*	1
Scrophulariaceae	*Hebenstretia sp.*	
Scrophulariaceae	*Jamesbrittenia aridicola*	
Scrophulariaceae	*Jamesbrittenia glutinosa*	
Scrophulariaceae	*Jamesbrittenia maxi*	
Scrophulariaceae	*Jamesbrittenia ramosissima*	
Scrophulariaceae	*Manulea gariepina*	
Scrophulariaceae	*Manulea nervosa*	
Scrophulariaceae	*Nemesia maxi*	
Scrophulariaceae	*Peliostomum leucorrhizum*	1
Scrophulariaceae	*Selago albida*	
Scrophulariaceae	*Zaluzianskya affinis*	
Scrophulariaceae	*Zaluzianskya diandra*	
Scrophulariaceae	*Zaluzianskya sanorum*	
Solanaceae	*Lycium oxycarpum*	
Solanaceae	*Lycium eenii*	1
Solanaceae	*Lycium pumilium*	1
Solanaceae	*Nicotiana glauca*	
Solanaceae	*Solanum capense*	1
Solanaceae	*Solanum rigescentoides*	
Solanaceae	*Solanum tomentosum var. tomentosum*	
Urticaceae	*Forsskaolea candida*	
Verbenaceae	*Chascanum garipense*	1
Verbenaceae	*Chascanum pumilum*	1
Viscaceae	*Viscum rotundifolium*	
Zygophyllaceae	*Augea capensis*	1
Zygophyllaceae	*Sisyndite spartea*	1
Zygophyllaceae	*Tribulus cristatus*	
Zygophyllaceae	*Tribulus pterophorus*	
Zygophyllaceae	*Tribulus terrestris*	
Zygophyllaceae	*Tribulus zeyheri subsp. zeyheri*	
Zygophyllaceae	*Zygophyllum dregeanum*	
Zygophyllaceae	*Zygophyllum decumbens*	1
Zygophyllaceae	*Zygophyllum flexuosum*	

Fabaceae	*Requienia sphaerosperma*	1	Zygophyllaceae	*Zygophyllum foetidum*	
Fabaceae	*Rhynchosia totta var. totta*		Zygophyllaceae	*Zygophyllum retrofractum*	1
Fabaceae	*Tephrosia dregeana var. dregeana*		Zygophyllaceae	*Zygophyllum simplex*	
Fabaceae	*Calobota spinescens*		Zygophyllaceae	*Zygophyllum stapffii*	

9 ANNEX 2. LIST OF MAMMALS

List of mammals which are likely to occur at the proposed Aggeneys 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.	High
Tubulentata:				
Orycteropus afer	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	High
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 capensis	Cape Hare	LC	Dry, open regions, with palatable bush and grass	High
Rodentia (Rodents):				
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	High
Petromus typicus	Dassie Rat	LC	Mountainous regions and inselbergs, where they are confined to rocky outcrops and live in crevices or piles of boulders	High
Xerus inauris	South African Ground Squirrel	LC	Open terrain with a sparse bush cover and a hard substrate	Definite
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
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.	High
Parotomys littledalei	Littledale's Whistling Rat	LC	Riverine associations or associated with Lycium bushes or Psilocaulon absimile	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
Gerbillurus tytonis	Dune Hairy-footed	LC	Hot dry areas on shifting red sand dunes	High

	Gerbil			
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	High
Gerbilliscus brantsii	Higheld Gerbil	LC	Sandy soils or sandy alluvium with some cover of grass, scrub or open woodland	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
Petromyscus collinus	Pygmy Rock Mouse	LC	Arid areas on rocky outcrops or koppies with a high rock cover	High
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):				
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
Felis nigripes	Black-footed cat	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub.	High
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	High
Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	High
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
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	High

Rumanantia (Antelope):				
Oryx gazella	Gemsbok	LC	Open arid country	Low
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	Low
Antidorcas marsupialis	Springbok	LC	Arid regions and open grassland.	Low
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Definite
Oreotragus oreotragus	Klipspringer	LC	Closely confined to rocky habitat.	High
Chiroptera (Bats)				
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
Tadarida pumila	Little free-tailed bat	LC	Wide habitat tolerance	High
Eidolon helvum	Straw-coloured fruit bat	LC	Occasional migratory visitors within southern Africa	Low

10 ANNEX 3. LIST OF REPTILES

List of reptiles which are likely to occur at the proposed Aggeneys Solar Facility. 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:					
Psammobates tentorius verroxii	Bushmanland Tent Tortoise	Endemic	Data Deficient	Varied: usually arid karroid areas or rocky sandveld	High
Snakes:					
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Endemic	Data Deficient	Varied: semi-desert, coastal bush, fynbos & savannah	Low
Rhinotyphlops schinzi	Schinz's Beaked Blind Snake	Endemic	Data Deficient	Semi-desert and arid savanna	High
Leptotyphlops occidentalis	Western Thread Snake	Endemic	Data Deficient	Namib Desert and Karoo scrub	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 bivittata	Two-striped Shovel-snout		Data Deficient	Acacia savannah entering sandveld	Low
Dipsina multimaculata	Dwarf Beaked Snake	Endemic	Data Deficient	Rocky, sandy areas. Cape karroid areas.	High
Psammophis notostictus	Karoo Sand or Whip Snake	Widespread	Data Deficient	Arid scrubland & karroid regions	High
Psammophis leightoni	Cape Whip Snake	Endemic	Data Deficient	Coastal fynbos, desert and semi-desert	High
Dasypeltis scabra	Common/Rhombic Egg Eater	Widespread	LC	Absent only from true desert & closed-canopy forest	High
Telescopus beetzii	Namib Tiger Snake	Endemic	Data Deficient	Rocky, arid regions	High
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
Naja nigricollis woodi	Black Spitting Cobra	Endemic	SARDB Rare	Namibia to Citrusdal in karroid scrub	High
Bitis arietans	Puff Adder	Widespread	Data Deficient	Absent only from desert & mnt tops	High
Bitis cornuta	Many-horned Adder	Endemic	Data Deficient	Mountainous regions, rocky outcrops. gravel plains and mountain fynbos	High

Bitis xeropaga	Desert Mountain Adder	Endemic	Data Deficient	Mountain slopes and sparsely vegetated rocky hillsides	Low
Bitis caudalis	Horned Adder	Widespread	Data Deficient	Sandy regions, throughout Karoo	High
Lizard and Skinks:					
Acontias lineatus	Striped Legless Skink	Endemic	Data Deficient	Sandy, arid soils	High
Mabuya capensis	Cape Skink	Widespread	Data Deficient	Very varied: arid karroid veld, moist coastal bush, montane grassland, etc	High
Mabuya occidentalis	Western Three-Striped Skink	Widespread	Data Deficient	Arid Savanna karroid veld and desert	High
Mabuya spilogaster	Kalahari Tree Skink	Widespread		Arid Savannah	Low
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
Meroles suborbitalis	Spotted Desert Lizard	Endemic	Data Deficient	Varied, arid savanna to desert	High
Meroles knoxii	Knox's Desert Lizard	Endemic	Data Deficient	Coastal dunes and succulent karroid veld	High
Nucras tessellata tessellata	Striped Sandveld Lizard	Widespread	Data Deficient	Open arid savannah & karroid veld	High
Pedioplanis laticeps	Cape Sand Lizard	Endemic	LC	Coastal dunes and succulent karroid veld	Low
Pedioplanis lineoocellata	Spotted Sand Lizard	Endemic	Data Deficient	Very varied: karroid veld, valley bushveld & arid & mesic savannah	High
Pedioplanis inornata	Plain Sand Lizard	Endemic	Data Deficient	Bedrock flats in semi-desert	High
Pedioplanis namaquensis	Namaqua Sand Lizard	Widespread	Data Deficient	Karroid veld	High
Pedioplanis undata	Western Sand Lizard	Widespread	Data Deficient	Prefers arid, sparsely vegetated desert	High
Cordylus cataphractus	Armadillo Girdled Lizard	Endemic	VU	Rock outcrops and mountain ranges	Low
Cordylus polyzonus	Karoo Girdled Lizard	Endemic	Data Deficient	Karroid regions, coastal renosterveld and succulent karoo	High
Agama aculeata	Ground Agama	Widespread	Data Deficient	Semi desert and savanna	High
Agama anchietae	Anchieta's Agama	Widespread	Data Deficient	Semi desert and arid savanna	High
Agama atra	Southern Rock Agama	Endemic	Data Deficient	Semi-desert to fynbos, from sea level to mountain tops	High
Chameleons:					
Chamaeleo namaquensis	Namaqua Chameleon	Widespread	LC	Sandy regions (incl coastal dunes) with scrub vegetation	High
Geckos:					

Chondrodactylus angulifer	Giant Ground Gecko	Endemic	LC	Gravel plains, interdune spaces & sandy flats	High
Lygodactylus bradfieldi	Bradfield's Dwarf Gecko	Widespread	Data Deficient	Arid savannah and succulent desert	High
Chondrodactylus bibronii	Bibron's Tubercled Gecko	Endemic	Data Deficient	Rocky outcrops, cliffs and large trees	High
Pachydactylus turneri	Turner's Thick-toed Gecko	Widespread	Data Deficient	Semi-desert and arid savannah	Low
Pachydactylus mariquensis	Marico Thick-toed Gecko	Endemic	Data Deficient	Flat sandy plains with sparse vegetation	High
Pachydactyus haackei	Haacke's Thick-toed Gecko	Endemic	Data Deficient	Large rock outcrops	Low
Pachydactylus rugosus	Rough Thick-toed Gecko	Endemic	Data Deficient	Semi-desert and succulent karroid veld	High
Pachydactylus serval	Western Spotted Gecko	Endemic	Data Deficient	Semi desert and succulent karroid veld	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

11 ANNEX 4. LIST OF AMPHIBIANS

List of amphibians which are likely to occur at the Aggeneys Solar Facility. 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	Likelihoood
Vandijkophrynus gariepensis	Karoo Toad	Not Threatened	Karoo Scrub	Widespread	Low
Vandijkophrynus robinsoni	Paradise Toad	Not Threatened	Natural springs and waterholes in the arid areas of the Richtersveld	Endemic	Low
Phrynomantis annectens	Marbled Rubber Frog	Not Threatened	Arid environments, closely associated with inselbergs and rocky areas	Widespread	Moderate
Xenopus laevis	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	Low

12 ANNEX 5. LIST OF BIRDS

List of birds which are likely to occur at the Aggeneys Solar Facility site. The list is derived from the SANBI SIBIS data portal 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	Dist	Status	Family	Species	Dist	Status
Accipitridae	*Aquila pennatus*		LC	Accipitridae	*Aquila verreauxii*		LC
Accipitridae	*Buteo rufofuscus*	Endemic	LC	Accipitridae	*Buteo vulpinus*		LC
Accipitridae	*Circaetus pectoralis*		LC	Accipitridae	*Circus maurus*	Endemic	NT
Accipitridae	*Elanus caeruleus*		LC	Accipitridae	*Gyps africanus*		VU
Accipitridae	*Melierax canorus*	Near-endemic	LC	Accipitridae	*Melierax gabar*		LC
Accipitridae	*Polemaetus bellicosus*		VU	Accipitridae	*Milvus migrans*		LC
Alaudidae	*Calandrella cinerea*		LC	Alaudidae	*Calendulauda africanoides*		LC
Alaudidae	*Calendulauda burra*	Endemic	LC	Alaudidae	*Calendulauda sabota*	Near-endemic	LC
Alaudidae	*Certhilauda curvirostris*	Endemic	LC	Alaudidae	*Chersomanes albofasciata*	Near-endemic	LC
Alaudidae	*Eremopterix australis*	Endemic	LC	Alaudidae	*Eremopterix verticalis*	Near-endemic	LC
Alaudidae	*Galerida magnirostris*	Endemic	LC	Alaudidae	*Mirafra apiata*	Endemic	LC
Alaudidae	*Spizocorys conirostris*	Near-endemic	LC	Alaudidae	*Spizocorys sclateri*	Endemic	NT
Alaudidae	*Spizocorys starki*	Near-endemic	LC	Anatidae	*Alopochen aegyptiacus*		LC
Anatidae	*Anas capensis*		LC	Anatidae	*Anas erythrorhyncha*		LC
Anatidae	*Anas smithii*	Near-endemic	LC	Anatidae	*Anas undulate*		LC
Anatidae	*Netta erythrophthalma*		LC	Anatidae	*Oxyura maccoa*		LC
Anatidae	*Plectropterus gambensis*		LC	Anatidae	*Tadorna cana*	Endemic	LC
Apodidae	*Apus affinis*		LC	Apodidae	*Apus apus*		LC
Apodidae	*Apus bradfieldi*	Near-endemic	LC	Apodidae	*Apus caffer*		LC
Apodidae	*Tachymarptis melba*		LC	Ardeidae	*Ardea cinerea*		LC
Ardeidae	*Ardea melanocephala*		LC	Ardeidae	*Bubulcus ibis*		LC
Ardeidae	*Egretta intermedia*		LC	Ardeidae	*Ixobrychus minutus*		LC
Burhinidae	*Burhinus capensis*		LC	Capitonidae	*Tricholaema leucomelas*	Near-endemic	LC
Caprimulgidae	*Caprimulgus rufigena*		LC	Charadriidae	*Charadrius hiaticula*		LC
Charadriidae	*Charadrius pallidus*		NT	Charadriidae	*Charadrius pecuarius*		LC
Charadriidae	*Charadrius tricollaris*		LC	Charadriidae	*Vanellus armatus*		LC
Charadriidae	*Vanellus coronatus*		LC	Ciconiidae	*Ciconia nigra*		NT
Coliidae	*Colius colius*	Endemic	LC	Coliidae	*Urocolius indicus*		LC
Columbidae	*Columba guinea*		LC	Columbidae	*Columba livia*		LC
Columbidae	*Oena capensis*		LC	Columbidae	*Streptopelia capicola*		LC
Columbidae	*Streptopelia semitorquata*		LC	Columbidae	*Streptopelia senegalensis*		LC

Corvidae	*Corvus albus*		LC
Cuculidae	*Chrysococcyx caprius*		LC
Estrildidae	*Estrilda astrild*		LC
Falconidae	*Falco biarmicus*		NT
Falconidae	*Falco rupicoloides*		LC
Fringillidae	*Crithagra albogularis*	Near-endemic	LC
Fringillidae	*Crithagra flaviventris*	Near-endemic	LC
Fringillidae	*Emberiza impetuani*	Near-endemic	LC
Glareolidae	*Cursorius rufus*	Near-endemic	LC
Halcyonidae	*Alcedo cristata*		LC
Hirundinidae	*Hirundo albigularis*		LC
Hirundinidae	*Hirundo rustica*		LC
Laniidae	*Lanius collaris*		LC
Laridae	*Chlidonias leucopterus*		LC
Malaconotidae	*Telophorus zeylonus*	Near-endemic	LC
Meropidae	*Merops hirundineus*		LC
Motacillidae	*Anthus crenatus*	Endemic	LC
Motacillidae	*Motacilla aguimp*		LC
Muscicapidae	*Batis pririt*	Near-endemic	LC
Muscicapidae	*Muscicapa striata*		LC
Nectariniidae	*Cinnyris chalybeus*	Endemic	LC
Nectariniidae	*Nectarinia famosa*		LC
Otididae	*Afrotis afra*	Endemic	LC
Otididae	*Neotis ludwigii*	Near-endemic	VU
Phoenicopteridae	*Phoenicopterus ruber*		NT
Ploceidae	*Euplectes orix*		LC
Ploceidae	*Passer domesticus*		LC
Ploceidae	*Philetairus socius*	Endemic	LC
Ploceidae	*Ploceus velatus*		LC
Ploceidae	*Sporopipes squamifrons*	Near-endemic	LC
Pteroclididae	*Pterocles bicinctus*	Near-endemic	LC
Pycnonotidae	*Pycnonotus nigricans*	Near-endemic	LC
Recurvirostridae	*Himantopus himantopus*		LC
Remizidae	*Anthoscopus minutus*	Near-endemic	LC
Scolopacidae	*Actitis hypoleucos*		LC
Corvidae	*Corvus capensis*		LC
Estrildidae	*Amadina erythrocephala*	Near-endemic	LC
Estrildidae	*Lagonosticta senegala*		LC
Falconidae	*Falco chicquera*		LC
Falconidae	*Polihierax semitorquatus*		LC
Fringillidae	*Crithagra atrogularis*		LC
Fringillidae	*Emberiza capensis*	Near-endemic	LC
Fringillidae	*Serinus alario*	Endemic	LC
Glareolidae	*Rhinoptilus africanus*		LC
Hirundinidae	*Delichon urbicum*		LC
Hirundinidae	*Hirundo fuligula*		LC
Hirundinidae	*Riparia paludicola*		LC
Laniidae	*Lanius minor*		LC
Malaconotidae	*Nilaus afer*		LC
Meropidae	*Merops apiaster*		LC
Motacillidae	*Anthus cinnamomeus*		LC
Motacillidae	*Anthus similis*		LC
Motacillidae	*Motacilla capensis*		LC
Muscicapidae	*Bradornis infuscatus*	Near-endemic	LC
Muscicapidae	*Stenostira scita*	Endemic	LC
Nectariniidae	*Cinnyris fuscus*	Near-endemic	LC
Otididae	*Ardeotis kori*		VU
Otididae	*Eupodotis vigorsii*	Endemic	LC
Phasianidae	*Coturnix coturnix*		LC
Plataleidae	*Threskiornis aethiopicus*		LC
Ploceidae	*Passer diffuses*		LC
Ploceidae	*Passer melanurus*	Near-endemic	LC
Ploceidae	*Plocepasser mahali*		LC
Ploceidae	*Quelea quelea*		LC
Podicipedidae	*Tachybaptus ruficollis*		LC
Pteroclididae	*Pterocles namaqua*	Near-endemic	LC
Rallidae	*Fulica cristata*		LC
Recurvirostridae	*Recurvirostra avosetta*		LC
Sagittariidae	*Sagiatarius serpentarius*		NT
Scolopacidae	*Arenaria interpres*		LC

Scolopacidae	*Calidris ferruginea*		LC	Scolopacidae	*Calidris minuta*		LC
Scolopacidae	*Tringa glareola*		LC	Scolopacidae	*Tringa nebularia*		LC
Scolopacidae	*Tringa stagnatilis*		LC	Scopidae	*Scopus umbretta*		LC
Strigidae	*Bubo africanus*		LC	Strigidae	*Bubo capensis*		LC
Struthionidae	*Struthio camelus*		LC	Sturnidae	*Creatophora cinerea*		LC
Sturnidae	*Lamprotornis nitens*		LC	Sturnidae	*Onychognathus nabouroup*	Near-endemic	LC
Sylviidae	*Acrocephalus baeticatus*		LC	Sylviidae	*Acrocephalus gracilirostris*		LC
Sylviidae	*Cisticola juncidis*		LC	Sylviidae	*Cisticola subruficapilla*	Near-endemic	LC
Sylviidae	*Eremomela gregalis*	Endemic	LC	Sylviidae	*Eremomela icteropygialis*		LC
Sylviidae	*Euryptila subcinnamomea*	Endemic	LC	Sylviidae	*Malcorus pectoralis*	Endemic	LC
Sylviidae	*Parisoma layardi*	Endemic	LC	Sylviidae	*Parisoma subcaeruleum*	Near-endemic	LC
Sylviidae	*Phragmacia substriata*	Endemic	LC	Sylviidae	*Phylloscopus trochilus*		LC
Sylviidae	*Prinia flavicans*	Near-endemic	LC	Sylviidae	*Prinia hypoxantha*	Endemic	LC
Sylviidae	*Sylvietta rufescens*		LC	Turdidae	*Cercomela familiaris*		LC
Turdidae	*Cercomela schlegelii*	Near-endemic	LC	Turdidae	*Cercomela sinuata*	Endemic	LC
Turdidae	*Cercomela tractrac*	Near-endemic	LC	Turdidae	*Cercotrichas coryphoeus*	Endemic	LC
Turdidae	*Cossypha caffra*		LC	Turdidae	*Monticola brevipes*	Near-endemic	LC
Turdidae	*Myrmecocichla formicivora*	Endemic	LC	Turdidae	*Oenanthe monticola*	Near-endemic	LC
Turdidae	*Oenanthe pileata*		LC	Turdidae	*Turdus olivaceus*		LC
Tytonidae	*Tyto alba*		LC	Upupidae	*Upupa Africana*		LC
Zosteropidae	*Zosterops pallidus*	Endemic	LC				

13 ANNEX 6. SPECIES OF CONSERVATION CONCERN OBSERVED AT THE BOESMANLAND SOLAR, ZUURWATER SITE

Species of conservation concern are illustrated below. The list includes species listed as threatened under the South African Red Data List of Plants, as well as those species which are provincially protected and are either significant or suitable for search and rescue. Common species within protected genera are not illustrated, but will nevertheless need to be listed on the permit application to clear the site.

Boscia foetida

Status	Provincially Protected
Suitable for search rescue	No
Abundance at site	Occasional
Description	Small tree, usually with white stems. Produces small green flowers and small round fruits.

Hoodia gordonii

Status	Nationally Protected
Suitable for search rescue	Yes
Abundance at site	Occasional
Description	Stem succulent up to 1m tall, but usually lower. Has spiny upright stems 5-10 cm wide. Produces large brownish flowers.

Euphorbia braunsii

Status	Provincially Protected
Suitable for search rescue	Yes
Abundance at site	Occasional
Description	Small stem succulent usually 10-25cm high, with somewhat spiny stems. Exudes milky late when injured.

Euphorbia multiceps

Status	Provincially Protected
Suitable for search rescue	Yes
Abundance at site	Occasional
Description	Small stem succulent usually 10-25cm high, with a single stem covered in protrusions and spines. Exudes milky late when injured.

14 ALIEN INVASIVE SPECIES AT THE SITE

Below are the major woody invaders at the site, which should be regularly cleared at the site.

Prosopis glandulosa

Medium to large tree with pinnate leaves and usually thorny. Usually associated with drainage lines, but may grow anywhere. Occasional at the site, but can increase rapidly as a result of disturbance.

When cut down the tree resprouts, so herbicides are usually needed in combination with cutting. The appropriate techniques and herbicides can be obtained from the DWAF website.

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:

ESKOM 300MW Kleinsee Wind Energy Facility. Fauna Specialist Report For Impact Assessment. Savannah Environmental. 2012.

Karoshoek Solar Valley Development, Near Upington: Fauna & Flora Specialist Impact Assessment Report. Savannah Environmental. 2012.

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Skuitdrift Solar Facility. Fauna & Flora Specialist Report for Basic Assessment. Specialist Report for Cape EAPrac. 2012.

Khoi-Sun Solar Facility. Fauna & Flora Specialist Scoping Report. Specialist Report for Cape EAPrac. 2012.

Boesmanland Solar Farm. Fauna & Flora Specialist Scoping Study. Specialist Report for Cape EAPrac. 2012.

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

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