PROPOSED ALLDAYS PHOTOVOLTAIC (PV)/ CONCENTRATED PHOTOVOLTAIC (CPV) SOLAR ENERGY FACILITY ON GOTHA FARM 102 MS, PHASE 1 (UP TO 75 MW), LIMPOPO PROVINCE

FAUNA & FLORA SPECIALIST STUDY FOR EIA

DEA REF. 14/12/16/3/3/2/329

PRODUCED FOR SAVANNAH ENVIRONMENTAL

ON BEHALF OF

BIOTHERM ENERGY (PTY) LTD

BY

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OCTOBER 2012

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DECLARATION OF CONSULTANTS' INDEPENDENCE

The author of this report, Simon Todd, does hereby declare that he is an independent consultant appointed by the Client and has no business, financial, personal or other interest in the activity, application or appeal in respect of which he was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of the specialist performing such work. All opinions expressed in this report are his own.

Simon Todd Pr.Sci.Nat

October 2012

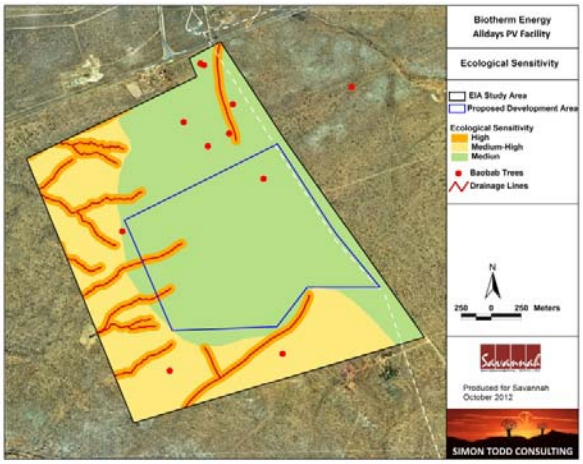
EXECUTIVE SUMMARY

This specialist ecological assessment details the impacts on fauna and flora likely to be associated with the development of the 75MW Alldays Solar Energy Facility northeast of Alldays in the Limpopo Province.

A site visit and desktop study were conducted to assess the presence and distribution of ecologically sensitive, species and habitats at the site. An ecological sensitivity map for the site was generated which is depicted below. The major ecological features of the site include a number of minor drainage lines along the southern and western edge of the study area as well as several Baobab trees scattered across the site.

Six major impacts were identified as being associated with the development of the site and were assessed:

- Impacts on vegetation and protected plant species
- Increased Alien Plant Invasion Risk
- Increased Soil Erosion Risk
- Faunal Impacts
- Avifaunal Impacts
- Reduced Landscape Connectivity



Erosion risk is identified as being a particular risk associated with the development on account of the extensive disturbance that would be associated with the clearing of the woody plants prior to construction. As the grass layer at the site is poorly developed, it is not likely that the natural vegetation would colonise the bare soil very quickly, which would leave the site vulnerable to erosion as well as alien plant invasion. It is therefore recommended that perennial grass species which occur naturally in the area are considered for proactive use to stabilize the site after it has been cleared. Species such as *Cynodon dactylon* and *Cenchrus ciliaris*, which are readily available and easily established are recommended for the purpose.

Although only one baobab tree is within the proposed development area, an additional six trees are within the adjacent 20MW facility, raising the potential for cumulative impact on this keystone species. The local environmental officials have recommended that any affected trees should be transplanted outside of the development footprint. Given the size of the trees, this would involve some cost as well as present some technical challenges. The input and supervision of someone who has experience in this task should be sought to assist with this task.

The proposed development area largely avoids the sensitive features of the site such as the drainage lines and steeper slopes along the southern and western boundaries of the site.

Nevertheless, the assessed impact of the development is not low for all impacts on account of the large impact on vegetation structure that would be associated with the development. Many fauna species will experience habitat loss that cannot be mitigated. Although this would create a significant local impact, the landscape as a whole is still largely intact and the development of the site would not be likely to disrupt broad-scale ecological processes or result in a significant loss of biodiversity at the landscape scale.

Summary assessment of the different impacts likely to be associated with the development of the site.

Impact	**Pre Mitigation**	**Post Mitigation**
Vegetation and listed species	High (65)	Medium (50)
Alien plant invasion risk	Medium (44)	Low (21)
Increased erosion risk	Medium (52)	Low (24)
Faunal Impacts	Medium (55)	Medium (36)
Avifaunal Impact	Medium (48)	Medium (30)
Reduced landscape connectivity	Medium (44)	Medium (30)

1 INTRODUCTION

Biotherm Energy (Pty) Ltd is proposing to develop a solar energy facility in the Limpopo Province adjacent to the Venetia mine northeast of Alldays. The development would have a maximum generation capacity of up to 75 MW and would be approximately 170 ha in extent. In terms of the EIA regulations, environmental authorisation is required before the development can proceed. Savannah Environmental is conducting the EIA process for the development and has appointed Simon Todd Consulting to contribute the ecological component. A scoping study for the development has already been conducted and the current study contributes to the impact assessment phase of the development and addresses the likely impact of the development on fauna and flora at the site.

1.1 SCOPE OF STUDY

The scope of the study includes the following activities

- a description of the environment that may be affected by the activity and the manner in which the environ mint may be affected by the proposed project
- a description and evaluation of environmental issues and potential impacts (incl. using direct, indirect and cumulative impacts) that have been identified
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- an indication of the methodology used in determining the significance of potential environmental impacts
- an assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria :
    - the nature of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected
    - the extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
    - the duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5- 15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent
    - the probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood) probable (distinct possibility), highly probable (most likely), or definite (Impact will occur regardless of any preventable measures)
    - the severity/beneficial scale indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit) severe/beneficial (long-term impact that could be mitigated/long-term benefit) moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect
    - the significance which shall be determined through a synthesis of the

characteristics described above and can be assessed as low medium or high
    - the status which will be described as either positive, negative or neutral
    - the degree to which the impact can be reversed
    - the degree to which the impact may cause irreplaceable loss of resources
    - the degree to which the impact can be mitigated
- a description and comparative assessment of all alternatives
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr)
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- a description of any assumptions uncertainties and gaps in knowledge
- an environmental impact statement which contains :
    - a summary of the key findings of the environmental impact assessment;
    - an assessment of the positive and negative implications of the proposed activity;
    - a comparative assessment of the positive and negative implications of identified alternatives

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 Plan (EMP) 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 phase

2 METHODOLOGY

2.1 DATA SOURCING AND REVIEW

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

Flora

- 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) 2229AC, AD, CA and CB was extracted from the SABIF/SIBIS database hosted by SANBI.
- This is a significantly larger extent than the study area, but this has been done in order to account for the fact that the study area has probably not been well sampled in the past.
- 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), where relevant.
- 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).

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 includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- The 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
- Bird species lists for the area were extracted from the SABAP 1 and SABAP 2 databases and Birdlife South Africa's Important Bird Areas was also consulted to ascertain if the site falls within the range of any range-restricted or globally threatened species.
- 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.

General

- 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

2.2 SAMPLING LIMITATIONS AND ASSUMPTIONS

There had been little rainfall preceding the site visit and the vegetation at the site was very dry and the ground layer was largely absent or in a dormant state. Consequently, the larger woody component was adequately assessed, but little of the ground layer could be identified and this component of the vegetation has not been well captured in the assessment. This limitation has to some extent been countered by deriving species lists of plants for the area from the SANBI SIBIS database in order to assess the possible presence of species of conservation concern which may be present but were not observed during the site visit. In addition, it is not likely that the dry conditions had a very large impact on the results, as the site was heavily dominated by woody species, particularly Mopane, which tends to suppress the grass layer in any event, and is often indicative of past overgrazing.

2.3 SITE VISIT

The site visit took place on the 20th of April 2012. During the site visit, the different biodiversity features, habitat, vegetation and landscape units present at the site were

identified and mapped in the field. An extensive walk-through-survey was conducted across the site, amounting to approximately10 km of walked searching 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. There were however, no natural mesic areas within the study area which might be favourable for amphibians, and the drainage lines present were dry at the time.

2.4 SENSITIVITY MAPPING & ASSESSMENT

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

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

2.5 RELEVANT ASPECTS OF THE DEVELOPMENT

Although a single site is being considered, the area which was assessed during the scoping phase and during the site visit is larger than that required for the development. The final development footprint depicted below, was produced by the developer in response to the results of this and the other specialist studies with the intention of minimising the impact of the development.

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/CPV 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
- 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. The connection to the ESKOM grid will either be from the on-site substation to the 132kV line which runs through the site or via a short overhead line to the Venetia substation, immediately north of the site.
- Service roads will run between the rows of arrays and will be used for maintenance activities such as cleaning the arrays.

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

- Auxiliary 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.

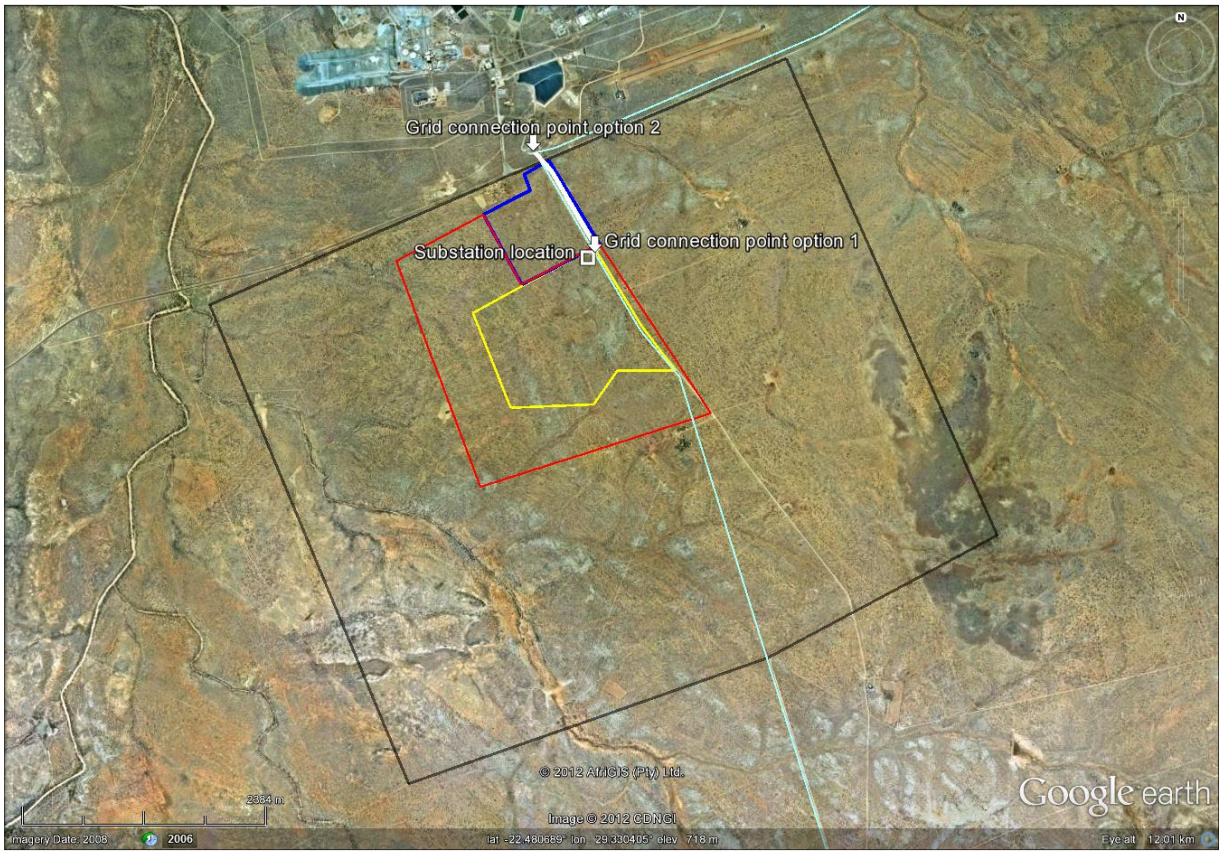


Figure 1. The proposed development area of the Biotherm Alldays Solar Facility outlined in yellow, with the broader study area in red and the adjacent 20MW facility in blue. The two grid connection options are also illustrated.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford 2006), only one vegetation type, Musina Mopane Bushveld occurs within the boundaries of the site. This vegetation type occupies 8797 km^2 of the far Northern Province, from around Baines Drift and Alldays in the west, remaining north of the Soutpansberg and south of the Limpopo River, through Musina and Tshipise to Malongavlakte, Masisi and Banyini Pan in the east. Associated mainly with land types, Ae, Ah, Fc and Db. More than 97% of the original extent of Musina Mopane Bushveld is still intact and it is classified as Least Threatened. Less than 3% is however conserved, compared to the desired target of 19%, indicating that the vegetation type is poorly conserved. No species of conservation concern are listed for this vegetation type by Mucina and Rutherford (2006). The only other vegetation type which occurs in the vicinity is Limpopo Ridge Bushveld, which occurs on the higher-lying areas to the north of the site and is also classified as Least Threatened. The distribution of the different vegetation types in the area is depicted below in Figure 2.

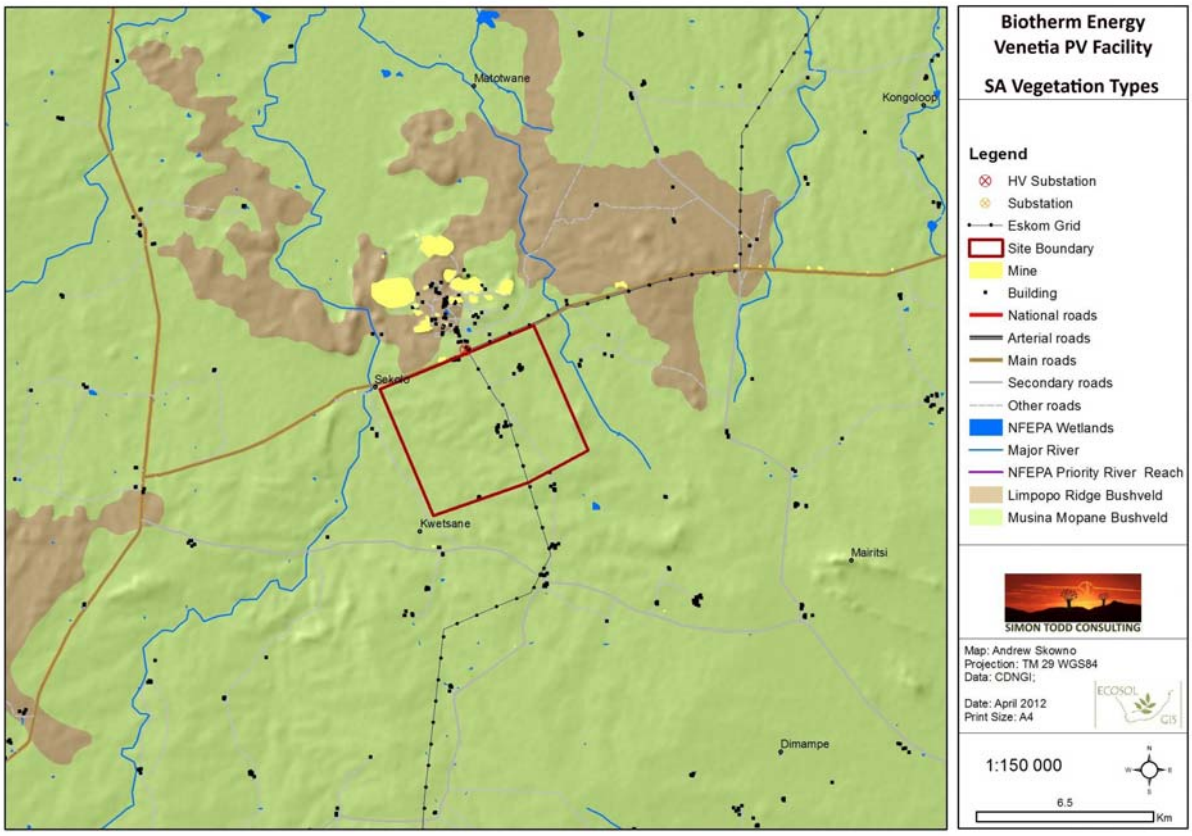


Figure 2. The broad-scale vegetation in and around the proposed Biotherm Alldays Solar Facility. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006). The entire site falls within the Musina Mopane Bushveld vegetation type.

3.2 FINE-SCALE VEGETATION PATTERNS

The vegetation of the site was fairly homogenous and was dominated to varying degrees by Mopane, *Colophospermum mopane* trees. In some parts of the site the density of mopane trees was high and there were few other species present. In such areas, the Mopane had also suppressed the ground layer which was very sparse and usually consisted of occasional unpalatable species such as *Blepharis pruinosa* or *Lycium cinereum*. In other areas, the vegetation consisted of a more diverse mixed woodland which included other tree species such as *Sclerocarya birrea*, *Adansonia digitata*, *Commiphora glandulosa*, *C.pyracanthoides*, *Dichrostachys cinerea*, *Acacia nigrescens*, *A.senegal*, *A.tortillis*, *Sterculia rogersii*, *Terminalia prunioides*, *Ehretia rigida* and *Grewia bicolor*. The understorey was also better developed within the areas of lower mopane density and consisted of species such as *Asparagus exuvialis*, *Asparagus nelsii*, *Blepharis pruinosa*, *Abutilon pycnodon*, *Barleria senensis*, *Cenchrus ciliaris*, *Aristida adscensionis*, *Sansevieria aethiopica* and *Lycium cinereum*. Perhaps as a result of the dry conditions or due to heavy grazing pressure, grass cover

within the site was exceptionally low and there were no areas present with a well developed grass layer.

There are no perennial rivers or water bodies within the site, but a number of ephemeral river courses occurred within the site, primarily along the southern and western boundaries of the EIA study area. As most of these drainage lines were within very rocky soils and were not very well developed, there was very little riparian vegetation associated with the drainage lines. There was also some evidence of erosion in this area, suggesting that disturbance on the steeper slopes of the site would significantly increase the risk of soil erosion.

A number of protected species occur at the site, including Marula and Baobab trees. The Boabab *Adansonia digitata* trees are of particular significance as these trees are keystone species which provide key resources for birds, bats and mammals. The Baobab is a nationally protected species under the Forests Act and a permit is required to impact on these species. At least ten Baobab trees occur within the current study area and the development area of the adjacent 20MW solar facility. However, only four trees occur within the study area for the current 75MW facility, only one of which lies within the final proposed development footprint. The dense tree cover at the site generally restricts visibility to less than 100m and so it may be possible that additional trees that were not observed occur within the proposed development area. The trees are however considerably taller than the surrounding vegetation and if any Baobab were not observed, it would only be a one or two trees at most. It was not possible to survey all Marula trees across the site on account of the dense bush cover, but the density within the areas that were covered in detail, suggests that the number of Marula trees that would be affected by the development would be approximately 30 trees.

Figure 3. Typical vegetation of the site. In the left image, an area highly dominated by Mopane trees, while in the right image a number of other tree species are also present including *Grewia*, *Commiphora*, *Terminalia* and *Sclerocarya birrea*. In both cases, the vegetation of the ground layer is very poorly developed, which was typical of the site.

Figure 4. Examples of the Baobab *Adansonia digitata* trees which occur within the study area. The large nests on the right hand tree were built by the Red-billed Buffalo-Weaver *Bubalornis niger*. The Baobab is a nationally protected species under the Forests Act.

3.3 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

The site lies within the planning domain of the Limpopo Conservation Plan (2011). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to maintain ecosystem functioning and meet national biodiversity objectives. The site does not lie within a CBA and there are no CBAs within the site. The nearest CBA areas are about 10 km east of the site, suggesting that the development would not have a significant impact on any CBAs (Figure 5). In terms of other broader-scale processes, the development is not likely to disrupt any faunal movement corridors or upland-lowland gradients in the area, as it does not occur within an area that can be considered part of a gradient or corridor.

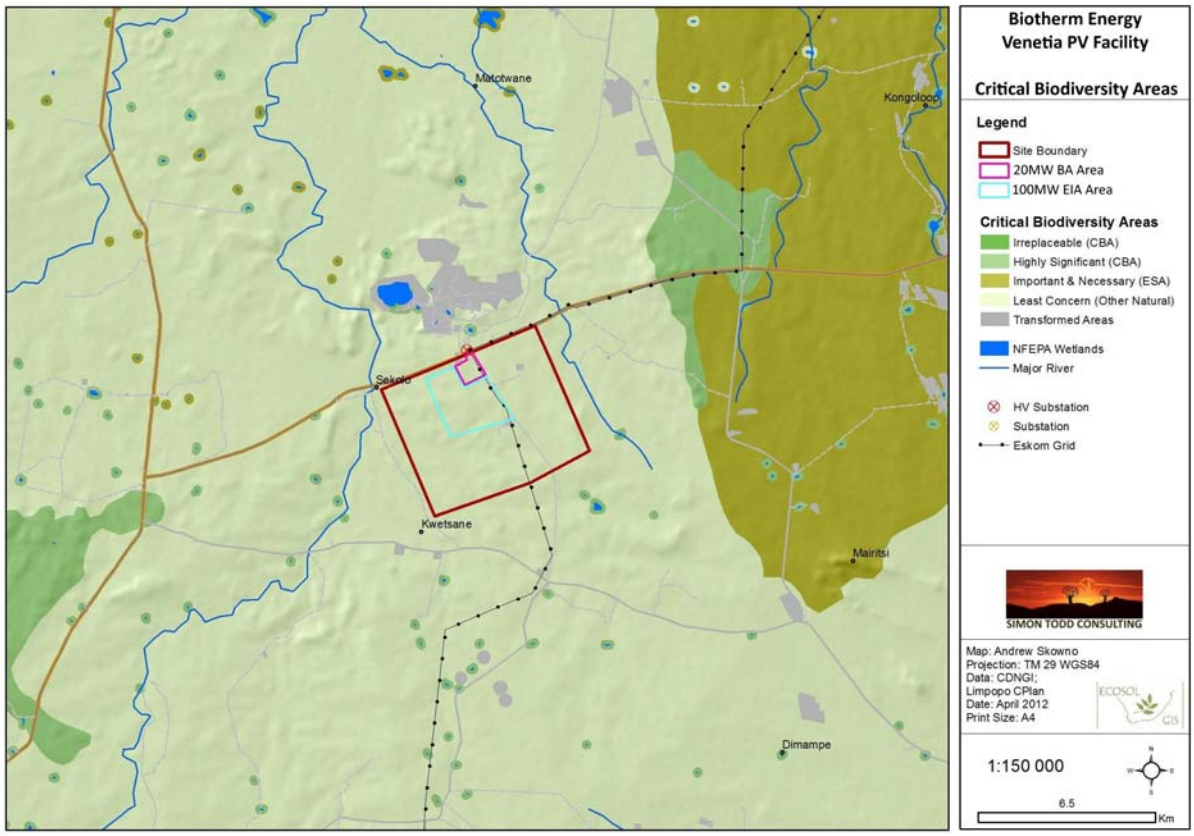


Figure 5. Critical Biodiversity Areas map of the Biotherm Alldays PV site and surrounding area. The only CBAs in the area are some distance from the site and would not be impacted by the development.

3.4 Faunal Communities

Mammals

The site falls within the distribution range of as many as 70 terrestrial mammals, indicating that the mammalian diversity at the site is potentially very high. However, the low diversity of habitats present at the site means that significantly less species than this will actually occur at the site. Four listed terrestrial mammals may occur at the site, the Honey Badger *Mellivora capensis* (Endangered), Leopard *Panthera pardus* (Near Threatened), Brown Hyaena *Hyaena brunnea* (Near Threatened) and Black-footed cat *Felis nigripes* (Vulnerable). Given the preponderance of game farming in the area, predators may be tolerated to a greater degree than in livestock farming areas and so it is possible that all of the listed species may occur in the area. The proximity of the site to the Venetia mine may deter shy species such as the Black-footed Cat from the area, but the other three species are naturally secretive and their presence and activity in close proximity to humans can easily go unnoticed. For the listed species, it is likely that the development would result in a small amount of habitat loss. This would not be highly significant within context as these species

all have a large home-range and the development would not be likely to actually displace any individuals of these species.

The site lies within the distribution range of as many as 25 bat species, indicating that the richness of bats at the site is potentially very high. The lack of wetlands and large drainage lines at the site, as well as the unlikelihood of any cave roosts in the vicinity suggests that the site is not likely to contain an abundance of species associated with these habitats. Nevertheless, a lot of chewed fruit was observed beneath some of the Baobab trees, indicating that fruit-eating species such as Wahlberg's Epauletted Fruit Bat *Epomophorus wahlbergi* are likely to be common at the site, at least during the fruiting season. Insectivorous species which roost in trees or houses are also likely to occur at the site as there are sufficient large trees present to provide holes and other suitable roosting shelter for such species. Schreibers' long-fingered bat *Miniopterus schreibersii* is the only listed species which occurs in the area. As this species requires suitable caves for roosting, it is not likely to be abundant in the area, as there are not likely to be any suitable caves in the vicinity.

Reptiles

The site lies within a broad area of reptile diversity and endemism. However, many of the range-restricted species which occur in the area are confined to the massifs to the south of the site such as the Blouberg and Soutpansberg and would not occur at the site itself. As the site contains no rocky outcrops, many of the species associated with such outcrops are not likely to occur at the site and the actual diversity of the site is likely to be significantly lower than the 84 reptile species which potentially occur in the area (Appendix 3).

Species observed at the site include the Variable Skink *Mabuya varia*, Striped Skink *Mabuya striata*, Common Rough-scaled Lizard *Ichnotropis squamulosa* and Peter's Ground Agama *Agama armata*. It is unlikely that any listed or highly localized reptile species occur at the site as it lacks specialised habitat for such species. Similarly, given the homogenous nature of the site, there were no specific habitats present at the site which are likely to be of greater significance for reptiles.

As no listed reptile species are likely to occur at the site and given the relatively limited extent of the development in comparison to the surrounding largely intact landscape, the impact on reptiles is likely to local in extent and of a generally low significance.

Amphibians

The site lies within the distribution range of 27 amphibian species, which indicates that amphibian diversity at the site is potentially very high. However, as there are few mesic or suitable breeding habitats at the site, it is generally unfavourable for those species associated with permanent water and the actual number of amphibians likely to occur at the site is likely to be quite low. The only listed species which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. As there is no suitable breeding habitat for this species within or near the site, the site is not likely to be an important habitat for this species. Given that there are no pans, rivers or permanent water

sources within the proposed development area, the impact on amphibians is likely to be local in nature and of low magnitude.

Avifauna

According to the SABAP 1 and SABAP 2 data sets, 360 bird species are known from the broad area surrounding the Alldays PV site. The area has been reasonably well sampled, with 97 cards for the area from SABAP 1 and 20 cards from SABAP 2. This suggests that there are not likely to be many species present which have not been recorded from the area before. The species list for the area includes 26 IUCN listed species, detailed below in Table 1. A large proportion of the listed species are susceptible to electrocution or collision from power-line infrastructure. The larger raptors are susceptible to both collision and electrocution, while the storks, bustards and flamingos are all vulnerable to collision with power lines. This is a potentially significant source of impact for these species.

Listed bird species observed at the site include the Southern Ground Hornbill *Bucorvus leadbeateri* and the Red-billed Oxpecker *Buphagus erythrorhynchus*, but a large proportion of the other species listed in Table 1 are also likely to frequent the site or pass through the area occasionally. Overall the development is likely to result in some habitat loss for resident bird species, which is to some extent mitigated by the proximity of the site to the tar road and the mine.

Table 1. Listed bird species known to occur in the vicinity of the proposed Biotherm Alldays Solar Facility, according to the SABAP 1 and 2 databases. The likelihood that it occurs in the study area is also listed and is based on the number of records for that species from the area, as well as an evaluation of the habitat suitability for the species.

Family	Species	Common Name	IUCN Status	Likelihood
Accipitridae	*Aquila rapax*	Tawny eagle	VU	High
Accipitridae	*Circus macrourus*	Pallid Harrier	NT	V. Low
Accipitridae	*Gyps africanus*	White-backed Vulture	VU	High
Accipitridae	*Gyps coprotheres*	Cape Vulture	VU	Moderate
Accipitridae	*Necrosyrtes monachus*	Hooded Vulture	VU	V.Low
Accipitridae	*Torgos tracheliotus*	Lappet-faced Vulture	VU	Moderate
Accipitridae	*Polemaetus bellicosus*	Martial Eagle	VU	Moderate
Accipitridae	*Terathopius ecaudatus*	Bateleur	VU	High
Anatidae	*Nettapus auritus*	African Pygmy Goose	NT	V. Low
Bucerotidae	*Bucorvus leadbeateri*	Southern Ground Hornbill	VU	Confirmed
Buphagidae	*Buphagus erythrorhynchus*	Red-billed Oxpecker	NT	Confirmed
Charadriidae	*Vanellus albiceps*	White-crowned Lapwing	NT	V.Low
Ciconiidae	*Anastomus lamelligerus*	African Open-billed Stork	NT	Moderate
Ciconiidae	*Ciconia episcopus*	Woolly-necked Stork	NT	Moderate
Ciconiidae	*Ciconia nigra*	Black Stork	NT	Moderate

Ciconiidae	*Ephippiorhynchus senegalensis*	Saddle-billed Stork	EN	High
Ciconiidae	*Leptoptilos crumeniferus*	Marabou Stork	NT	High
Ciconiidae	*Mycteria ibis*	Yellow-billed Stork	NT	High
Falconidae	*Falco biarmicus*	Lanner Falcon	NT	Low
Falconidae	*Falco naumanni*	Lesser Kestrel	VU	Low
Otididae	*Ardeotis kori*	Kori Bustard	VU	High
Pelecanidae	*Pelecanus onocrotalus*	Great White Pelican	NT	V. Low
Phoenicopteridae	*Phoenicopterus ruber*	Greater flamingo	NT	V. Low
Rostratulidae	*Rostratula benghalensis*	Greater Painted Snipe	NT	Moderate
Sagittariidae	*Sagittarius serpentarius*	Secretary Bird	NT	Low
Strigidae	*Scotopelia peli*	Pel's Fishing Owl	VU	V. Low

3.5 SITE SENSITIVITY ASSESSMENT

The ecological sensitivity map of the Biotherm Alldays Solar Facility is depicted in Figure 7 below. Apart from the some relatively minor drainage lines, there are no highly significant biodiversity features within the study area. The southern and western margins of the study area have been assessed as being of somewhat higher sensitivity than the rest of the site, on account of the steep slope of this area as well as the high density of drainage features present. The baobab trees within the site are considered to be a significant ecological feature given the role these trees play in the ecology of the area. Although there are quite a number of baobabs within the study area, there is only one tree within the proposed development area for the 75MW facility. Due to the large shadow it would cast, its presence is not compatible with the operation of a solar energy facility and it will have to be moved, which will require a permit. There are a relatively large number of marula trees within the site and based on their estimated density, approximately 30 trees would be impacted by the development. The marula tree is however common in the area and within the broader site and the loss of the trees from the development area, would not significantly impact the local or regional population of this species.

In terms of the major risk factors likely to be associated with the development, erosion risk would be high as clearing the woody vegetation from the site would be likely to create a large amount of disturbance and the ground layer is not currently well developed which would leave the soil in the disturbed areas bare and vulnerable to erosion. Some parts of the site are also reasonably steep which would also increase the erosion risk.

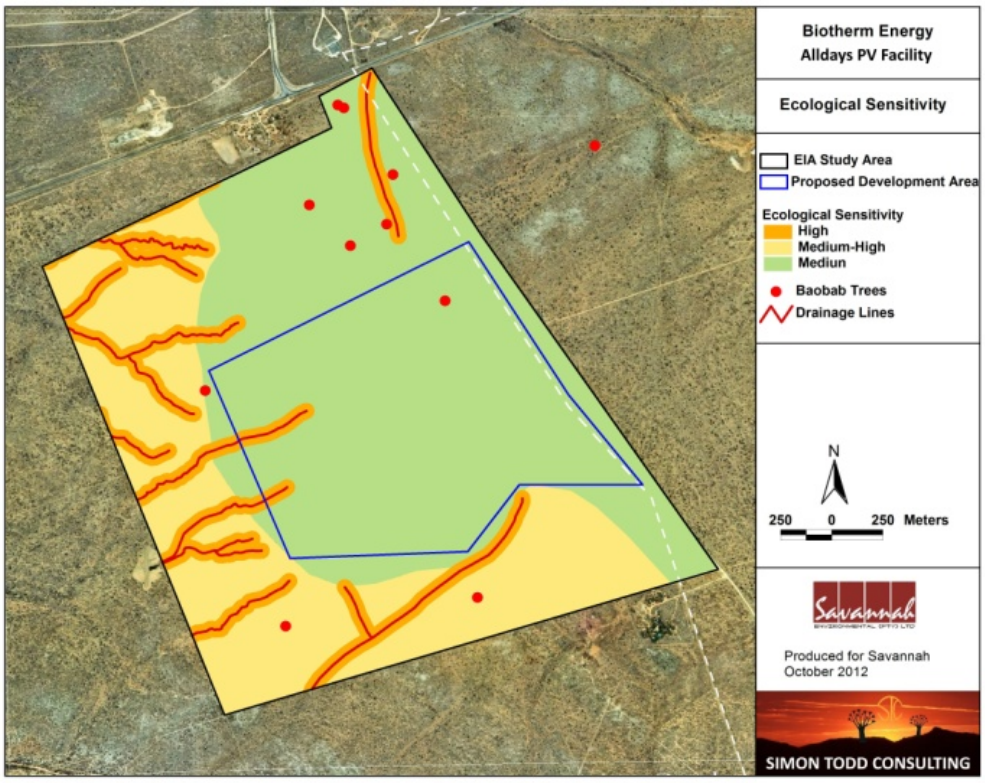


Figure 7. Ecological Sensitivity map of the proposed Alldays Solar Facility site, illustrating the proposed development area within the study area.

4 IMPACT ASSESSMENT

4.1 ASSESSMENT & SIGNIFICANCE CRITERIA

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

- The **nature** which includes a description of what causes the effect what will be affected and how it will be affected.

- The **extent** wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 is assigned as appropriate (with 1 being low and 5 being high):

- The **duration** wherein it is indicated whether:

    - the lifetime of the impact will be of a very short du ration (0- 1 years) - assigned a score of 1.
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a

score of 2.
- medium-term (5-15 years) - assigned a score of 3
- long term (> 15 years) - assigned a score of 4; or
- permanent - assigned a score of 5

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

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

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

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

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

The significance weightings for each potential impact are as follows:

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

5 IDENTIFICATION AND NATURE OF IMPACTS

5.1 IMPACT ORIGIN

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
- Presence and operation of heavy machinery
- Human presence and disturbance

Operational Phase

- Maintenance activities
- Human presence
- Presence of the facility & associated infrastructure

The above activities are likely to manifest themselves as the following impacts, which are assessed in the next section of the report:

- Impacts on vegetation and protected plant species
- Increased Alien Plant Invasion Risk
- Increased Soil Erosion Risk
- Faunal Impacts
- Avifaunal Impacts
- Reduced Landscape Connectivity

5.1.1 Impact Nature

Impacts on vegetation and protected plant species

Some loss of vegetation is an inevitable consequence of the development. In addition, the abundance of Marula trees at the site was high and a relatively large number of these trees are likely to be affected as well as one Baobab tree.

Increased Alien Plant Invasion Risk

Disturbance created at the site during construction would leave the site vulnerable to alien plant invasion. Clearing the site would result in a large amount of disturbance and as the grass layer is poorly developed, it is not likely that an indigenous plant cover would rapidly colonise the cleared areas to limit the invasion potential of the area.

Increased Soil Erosion Risk

The development of the site would create a lot of soil disturbance, which would leave the site susceptible to erosion. This may be a particular concern at the site on account of the poorly developed grass layer, which probably does not have sufficient soil seedbanks present to quickly colonise cleared areas and limit erosion potential. In addition, the panels and hardened surfaces of the roads and other infrastructure would generate a lot of runoff, which will further increase erosion risk.

Faunal Impacts

During the construction phase, there will be a lot of disturbance and noise at the site which will drive many species away from the area. The presence of large number of construction personnel will also lead to increased risk to species such as snakes, tortoises and mammals which would be vulnerable to poaching for food, trade or killed out of fear and superstition. During the operational phase, the large change in vegetation structure will render the area unsuitable for many species which will consequently experience long-term habitat loss as a result.

Avifaunal Impacts

Direct and indirect impacts of the development on avifauna would result from habitat loss as well as the risk of electrocution and collisions with transmission lines. This includes potential impact on 26 listed bird species.

Reduced Landscape Connectivity

The development of the site will require the clearing of all woody species present and the remaining vegetation will be restricted to the grass layer. This will impact the connectivity of the landscape as many species will avoid the development due to the change in vegetation structure as well as human presence and fencing around the site.

5.2 ASSESSMENT OF IMPACTS – SOLAR ENERGY FACILITY

The six major impacts identified above which are likely to be associated with the development of the solar energy facility are assessed below.

Impact 1: *Impacts on vegetation and protected plant species*

Impact Nature: Impacts on vegetation and protected plant species would occur due to the construction of the facility, which will require extensive site clearing.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium-High (7)	Medium (5)
Probability	Definite (5)	Definite (5)

Significance	High (65)	Medium (50)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Yes	
Can impacts be mitigated?	Largely Not, as all the woody vegetation present will need to be cleared.	
Mitigation	• Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. • Where roads and other infrastructure cross sensitive features such as drainage lines, caution should be exercised to ensure that impact to these features are minimised. • The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction. This would include any baobab trees present within the development footprint. • Development would be likely to encourage alien plant invasion and measures to prevent and limit alien plant invasion should be implemented as part of the EMPr for the development.	
Cumulative Impacts	The potential for cumulative impacts is quite high on account of the approval of a 20MW facility adjacent to the site as well as the Venetia mine, which is an already existing impact. These developments would result in a significant cumulative impact at a local level, but the significance at the landscape level is likely to be fairly low.	
Residual Impacts	The development requires that all the woody vegetation within the development footprint is cleared, which cannot be avoided or fully mitigated.	

Impact 2. *Increased alien plant invasion*

Impact Nature: Alien plants are likely to invade the site as a result of disturbance created during construction		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Short-term (2)
Magnitude	Medium (5)	Low (3)
Probability	Highly Probable (4)	Improbable (3)
Significance	Medium (44)	Low (21)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated?	Yes	
Mitigation	• Cleared areas which are not surfaced or required for construction should be revegetated with seed or plants of locally occurring species. • Regular monitoring for alien plants within the development footprint. • Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. • Alien management plan should be developed as part of the EMPr for the development.	
Cumulative Impacts	If alien plant abundance in the area increases to a large degree then some cumulative impacts would result and invasion is likely to spill over into adjacent intact areas.	
Residual Impacts	If alien species at the site are controlled, then there will be very little residual impact	

Impact 3. *Increased erosion risk.*

Impact Nature: Increased erosion risk would occur as a result of soil disturbance and loss of vegetation cover.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)

Duration	Long-term (4)	Short-term (2)
Magnitude	Medium-High (7)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (52)	Low (24)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated?	Yes	
Mitigation	• The development will require the clearing of all woody species present, which will create a lot of disturbance at the site. Seeding of cleared areas with locally occurring grass species should occur as soon after vegetation clearing as possible, even if construction activities are going to commence thereafter. Suitable species would include *Cenchrus ciliaris* and *Cynodon dactylon*. • All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • Regular monitoring for erosion during and after construction to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	
Cumulative Impacts	Higher sediment loads in rivers and streams will affect in-stream vegetation and biota	
Residual Impacts	If erosion at the site is controlled, then there will be no residual impact	

Impact 4. *Faunal Impacts.*

Impact Nature: Disturbance, transformation and loss of habitat will have a negative effect on resident fauna.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (5)	Low (3)
Probability	Definite (5)	Highly Probable (4)
Significance	Medium (55)	Medium (36)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	Yes	Yes
Can impacts be mitigated?	Some aspects such as those relating to human activity can be mitigated, but habitat loss cannot be mitigated.	
Mitigation	• Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site. • 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. • If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • No unauthorized persons should be allowed onto the site. • All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.	
Cumulative Impacts	The other PV facility and the mine will result in some cumulative impact, which is likely to be locally significant,	

	but given the total expected extent of habitat loss, this is not likely to be of broader significance.
Residual Impacts	Some habitat loss is an inevitable consequence of the development and cannot be fully mitigated.

Impact 5. *Avifaunal Impacts.*

Impact Nature: Avifauna will experience some habitat loss as a result of the development as well as a potentially increased risk of collisions and electrocution with the powerline infrastructure.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (48)	Medium (30)
Status	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To some degree	
Mitigation	• The grid connection option that does not require a transmission line, would be preferablefor avifauna. • Ensure that if new lines are required, they are marked with bird flight diverters along their entire length. If the new line was to run parallel to existing unmarked line this would potentially create a net benefit as this could reduce the collision risk posed by the older line. • All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). These activities should be supervised by someone with experience in this field. • Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.	
Cumulative Impacts	The current development in conjuction with the adjacent 20MW facility and the mine would create a significant amount of transformation in area. Given the mobility of birds and the large extent of available intact habitat in the	

	area, this would not amount to a highly significant impact for most avifauna. In addition, there do not appear to be any features present that would suggest that the area is particularly important for birds and vulnerable to cumulative impacts.
Residual Impacts	The large change in vegetation structure resulting from the development would amount to long-term habitat loss for most species.

Impact 6. *Reduced landscape connectivity.*

Impact Nature: The development would result in a large change in vegetation structure within the site, which would render it unsuitable for many species, while others would be excluded by the security fencing around the facility. This would make it difficult for affected fauna to move through the area.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (5)	Medium(4)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Medium (30)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	No. The impact will remain in place for as long as the facility was present.	
Mitigation	• Shrubs and a grass layer should be encouraged within the facility, especially in those areas not required for regular operational and maintenance use. • Only the taller woody vegetation should be cleared. • Woody vegetation should be cleared by hand and herbicides should not be used.	
Cumulative Impacts	The current development would contribute to cumulative habitat loss and disruption of landscape connectivity in the area.	
Residual Impacts	The change in vegetation structure will be permanent and for those species which require such habitat, mitigation will not be possible. If a ground layer of grass and shrubs can be maintained within parts of the facility, many smaller species will benefit and the residual impact on such species	

	will be low.

5.3 SUMMARY ASSESSMENT

A summary assessment of the different impacts likely to be associated with the development of the Alldays Solar Energy facility is provided below in Table 3. Many of the pre-mitigation impacts are quite high. This is on account of the large amount of disturbance and associated habitat loss that will be associated with the development of the site. With mitigation, the impacts can all be reduced to a moderate to low level. Some residual impact remains for many impacts as the loss of habitat cannot be mitigated on account of the large change in vegetation structure that will be associated with the development of the site. Overall, the development of the site is likely to create a significant local impact. However, within the context of the surrounding landscape the impact is not likely to be broader significant given the extent of intact habitat in the area, and the relatively limited extent of the development when considered at the landscape scale. In addition, it is not likely that the area is very important as a faunal movement corridor as it does not appear to lie within any obvious ecological gradients.

Table 3. Summary assessment of the different impacts likely to be associated with the development of the site.

Impact	Pre Mitigation	Post Mitigation
Vegetation and listed species	High (65)	Medium (50)
Alien plant invasion risk	Medium (44)	Low (21)
Increased erosion risk	Medium (52)	Low (24)
Faunal Impacts	Medium (55)	Medium (36)
Avifaunal Impact	Medium (48)	Medium (30)
Reduced landscape connectivity	Medium (44)	Medium (30)

6 CONCLUSION & RECOMMENDATIONS

The proposed development area largely avoids the sensitive features of the site such as the drainage lines and steeper slopes along the southern and western boundaries of the site. Nevertheless, the impact of the development is not low on account of the large impact on vegetation structure that would be associated with the development. As a result of the clearing of woody species at the site, many species will experience localized habitat loss that

cannot be mitigated. Although this would create a significant local impact, the landscape as a whole is still largely intact and the development of the site would not be likely to disrupt broad-scale ecological processes or result in a significant loss of biodiversity at the landscape scale.

Erosion risk is identified as being a particular risk associated with the development on account of the wooded nature of the site. Site preparation would involve a lot of disturbance, which would leave the site vulnerable to erosion as well as alien plant invasion. It is therefore recommended that perennial grasses which occur naturally in the area are considered for proactive use to stabilize the site after it has been cleared. A mix of fast growing annual and perennial grass species could be used, which could include species such as *Cynodon dactylon* and *Cenchrus ciliaris*, which are readily available and easily established.

Only one baobab tree is known to occur within the development footprint, while the impact on marula trees is also likely to be relatively low. Although only one baobab tree is within the proposed development area, an additional six trees are within the adjacent 20MW facility, raising the potential for cumulative impact on this keystone species. The local environmental officials have recommended that any affected trees should be transplanted outside of the development footprint. Given the size of the trees, this would involve some cost as well as present some technical challenges. The input and supervision of someone who has experience in this task should be sought to assist with this task.

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8 ANNEX 1. LIST OF PLANTS

List of plant species which were observed at the Biotherm Alldays PV site. Conservation status is from the Threatened Species Programme, Red List of South African Plants (2011).

Family	Species	Status	Family	Species	Status
Acanthaceae	*Barleria affinis*	LC	Acanthaceae	*Barleria galpinii*	LC
Acanthaceae	*Barleria macrostegia*	LC	Acanthaceae	*Barleria meyeriana*	LC
Acanthaceae	*Barleria senensis*	LC	Acanthaceae	*Barleria transvaalensis*	LC
Acanthaceae	*Blepharis aspera*	LC	Acanthaceae	*Blepharis integrifolia var. clarkei*	LC
Acanthaceae	*Blepharis transvaalensis*	LC	Acanthaceae	*Chaetacanthus costatus*	LC
Acanthaceae	*Crabbea angustifolia*	LC	Acanthaceae	*Dicliptera spinulosa*	LC
Acanthaceae	*Hypoestes forskaolii*	LC	Acanthaceae	*Justicia anagalloides*	LC
Acanthaceae	*Justicia flava*	LC	Acanthaceae	*Justicia matammensis*	LC
Acanthaceae	*Justicia odora*	LC	Acanthaceae	*Justicia protracta subsp. rhodesiana*	LC
Acanthaceae	*Lepidagathis scabra*	LC	Acanthaceae	*Megalochlamys revoluta subsp. cognata*	LC
Acanthaceae	*Monechma divaricatum*	LC	Acanthaceae	*Neuracanthus africanus var. africanus*	LC
Acanthaceae	*Rhinacanthus xerophilus*	LC	Acanthaceae	*Ruellia otaviensis*	LC
Acanthaceae	*Ruellia patula*	LC	Acanthaceae	*Thunbergia aurea*	LC
Aizoaceae	*Trianthema salsoloides var. Salsoloides*	LC	Aizoaceae	*Trianthema salsoloides var. stenophylla*	LC
Aizoaceae	*Zaleya pentandra*	LC	Amaranthaceae	*Aerva leucura*	LC
Amaranthaceae	*Amaranthus praetermissus*	LC	Amaranthaceae	*Cyathula lanceolata*	LC
Amaranthaceae	*Cyathula orthacantha*	LC	Amaranthaceae	*Hermbstaedtia fleckii*	LC
Amaranthaceae	*Hermbstaedtia odorata var. albi-rosea*	LC	Amaranthaceae	*Leucosphaera bainesii*	LC
Amaranthaceae	*Pupalia lappacea var. lappacea*	LC	Amaranthaceae	*Sericorema remotiflora*	LC
Amaryllidaceae	*Nerine laticoma*	LC	Anacardiaceae	*Protorhus longifolia*	LC
Anacardiaceae	*Sclerocarya birrea subsp. caffra*	LC	Annonaceae	*Hexalobus monopetalus var. monopetalus*	LC
Apocynaceae	*Asclepias adscendens*	LC	Apocynaceae	*Asclepias brevipes*	LC
Apocynaceae	*Asclepias multicaulis*	LC	Apocynaceae	*Fockea angustifolia*	LC
Apocynaceae	*Gomphocarpus tomentosus subsp. tomentosus*	LC	Apocynaceae	*Hoodia currorii subsp. lugardii*	LC
Apocynaceae	*Pachycarpus schinzianus*	LC	Apocynaceae	*Pentarrhinum insipidum*	LC
Apocynaceae	*Secamone parvifolia*	LC	Apocynaceae	*Stapelia gettliffei*	LC
Apocynaceae	*Tacazzea apiculata*	LC	Apocynaceae	*Tavaresia barklyi*	LC
Asparagaceae	*Asparagus nelsii*	LC	Asparagaceae	*Asparagus setaceus*	LC
Asparagaceae	*Asparagus suaveolens*	LC	Asphodelaceae	*Aloe littoralis*	LC
Asteraceae	*Brachylaena huillensis*	LC	Asteraceae	*Dicoma tomentosa*	LC
Asteraceae	*Doellia cafra*	LC	Asteraceae	*Geigeria acaulis*	LC
Asteraceae	*Geigeria burkei subsp. fruticulosa*	LC	Asteraceae	*Helichrysum argyrosphaerum*	LC
Asteraceae	*Laggera decurrens*	LC	Asteraceae	*Litogyne gariepina*	LC

Family	Species	Status	Family	Species	Status
Asteraceae	*Nidorella resedifolia subsp. resedifolia*	LC	Asteraceae	*Pegolettia senegalensis*	LC
Asteraceae	*Philyrophyllum schinzii*	LC	Asteraceae	*Pseudoconyza viscosa*	LC
Asteraceae	*Psiadia punctulata*	LC	Asteraceae	*Senecio erubescens var. erubescens*	LC
Asteraceae	*Senecio laevigatus var. laevigatus*	LC	Asteraceae	*Sonchus wilmsii*	LC
Asteraceae	*Sphaeranthus peduncularis subsp. peduncularis*	LC	Asteraceae	*Vernonia fastigiata*	LC
Balanitaceae	*Balanites pedicellaris subsp. pedicellaris*	LC	Bignoniaceae	*Catophractes alexandri*	LC
Bignoniaceae	*Markhamia zanzibarica*	LC	Bignoniaceae	*Rhigozum brevispinosum*	LC
Bignoniaceae	*Rhigozum zambesiacum*	LC	Boraginaceae	*Cordia sinensis*	LC
Boraginaceae	*Cynoglossum hispidum*	LC	Boraginaceae	*Cynoglossum lanceolatum*	LC
Boraginaceae	*Ehretia rigida subsp. rigida*	LC	Boraginaceae	*Heliotropium ciliatum*	LC
Boraginaceae	*Heliotropium giessii*	LC	Boraginaceae	*Heliotropium ovalifolium*	LC
Boraginaceae	*Heliotropium strigosum*	LC	Boraginaceae	*Lithospermum cinereum*	LC
Boraginaceae	*Trichodesma angustifolium subsp. angustifolium*	LC	Brassicaceae	*Erucastrum griquense*	LC
Burseraceae	*Commiphora africana var. africana*	LC	Burseraceae	*Commiphora edulis subsp. edulis*	LC
Burseraceae	*Commiphora glandulosa*	LC	Burseraceae	*Commiphora mollis*	LC
Burseraceae	*Commiphora pyracanthoides*	LC	Burseraceae	*Commiphora schimperi*	LC
Burseraceae	*Commiphora tenuipetiolata*	LC	Burseraceae	*Commiphora viminea*	LC
Campanulaceae	*Wahlenbergia denticulata var. Denticulate*	LC	Campanulaceae	*Wahlenbergia undulata*	LC
Capparaceae	*Boscia albitrunca*	LC	Capparaceae	*Boscia foetida subsp. rehmanniana*	LC
Capparaceae	*Cadaba termitaria*	LC	Capparaceae	*Cleome angustifolia subsp. petersiana*	LC
Capparaceae	*Cleome gynandra*	LC	Capparaceae	*Cleome monophylla*	LC
Capparaceae	*Cleome oxyphylla var. oxyphylla*	LC	Capparaceae	*Cleome oxyphylla var. robusta*	LC
Capparaceae	*Maerua angolensis subsp. angolensis*	LC	Capparaceae	*Maerua juncea subsp. crustata*	LC
Capparaceae	*Maerua parvifolia*	LC	Caryophyllaceae	*Silene undulata*	LC
Celastraceae	*Gymnosporia senegalensis*	LC	Clusiaceae	*Garcinia livingstonei*	LC
Combretaceae	*Combretum apiculatum subsp. apiculatum*	LC	Combretaceae	*Combretum imberbe*	LC
Combretaceae	*Combretum microphyllum*	LC	Combretaceae	*Combretum mossambicense*	LC
Combretaceae	*Terminalia prunioides*	LC	Combretaceae	*Terminalia sericea*	LC
Commelinaceae	*Commelina benghalensis*	LC	Commelinaceae	*Commelina erecta*	LC
Convolvulaceae	*Evolvulus alsinoides*	LC	Convolvulaceae	*Ipomoea albivenia*	LC
Convolvulaceae	*Ipomoea bolusiana*	LC	Convolvulaceae	*Ipomoea coptica*	LC
Convolvulaceae	*Ipomoea magnusiana*	LC	Convolvulaceae	*Ipomoea sinensis subsp. blepharosepala*	LC
Convolvulaceae	*Merremia pinnata*	LC	Convolvulaceae	*Seddera suffruticosa*	LC
Crassulaceae	*Kalanchoe brachyloba*	LC	Crassulaceae	*Kalanchoe lanceolata*	LC
Cucurbitaceae	*Momordica balsamina*	LC	Cucurbitaceae	*Momordica boivinii*	LC
Cyperaceae	*Courtoisina cyperoides*	LC	Cyperaceae	*Cyperus alopecuroides*	LC

Family	Species	Status	Family	Species	Status
Cyperaceae	*Cyperus difformis*	LC	Cyperaceae	*Cyperus distans*	LC
Cyperaceae	*Cyperus iria*	LC	Cyperaceae	*Cyperus longus var. tenuiflorus*	LC
Cyperaceae	*Cyperus obtusiflorus var. obtusiflorus*	LC	Cyperaceae	*Cyperus rotundus subsp. rotundus*	LC
Cyperaceae	*Cyperus squarrosus*	LC	Cyperaceae	*Fuirena ciliaris*	LC
Cyperaceae	*Kyllinga alba*	LC	Cyperaceae	*Pycreus pelophilus*	LC
Dipsacaceae	*Scabiosa columbaria*	LC	Dracaenaceae	*Sansevieria aethiopica*	LC
Ebenaceae	*Diospyros lycioides subsp. lycioides*	LC	Elatinaceae	*Bergia salaria*	LC
Euphorbiaceae	*Acalypha indica var. indica*	LC	Euphorbiaceae	*Acalypha segetalis*	LC
Euphorbiaceae	*Croton gratissimus var. gratissimus*	LC	Euphorbiaceae	*Croton gratissimus var. subgratissimus*	LC
Euphorbiaceae	*Croton megalobotrys*	LC	Euphorbiaceae	*Euphorbia cooperi var. cooperi*	LC
Euphorbiaceae	*Euphorbia monteiroi subsp. ramosa*	LC	Euphorbiaceae	*Euphorbia neopolycnemoides*	LC
Euphorbiaceae	*Euphorbia schinzii*	LC	Euphorbiaceae	*Tragia dioica*	LC
Euphorbiaceae	*Tragia rupestris*	LC	Fabaceae	*Acacia erioloba*	Declining
Fabaceae	*Tephrosia pondoensis*	EN	Fabaceae	*Acacia caffra*	LC
Fabaceae	*Acacia erubescens*	LC	Fabaceae	*Acacia grandicornuta*	LC
Fabaceae	*Acacia hebeclada subsp. hebeclada*	LC	Fabaceae	*Acacia karroo*	LC
Fabaceae	*Acacia mellifera subsp. detinens*	LC	Fabaceae	*Acacia nebrownii*	LC
Fabaceae	*Acacia nigrescens*	LC	Fabaceae	*Acacia nilotica subsp. kraussiana*	LC
Fabaceae	*Acacia robusta subsp. robusta*	LC	Fabaceae	*Acacia schweinfurthii var. schweinfurthii*	LC
Fabaceae	*Acacia senegal var. rostrata*	LC	Fabaceae	*Aeschynomene indica*	LC
Fabaceae	*Albizia anthelmintica*	LC	Fabaceae	*Albizia brevifolia*	LC
Fabaceae	*Albizia harveyi*	LC	Fabaceae	*Cassia abbreviata subsp. beareana*	LC
Fabaceae	*Chamaecrista absus*	LC	Fabaceae	*Chamaecrista biensis*	LC
Fabaceae	*Colophospermum mopane*	LC	Fabaceae	*Crotalaria damarensis*	LC
Fabaceae	*Crotalaria distans subsp. distans*	LC	Fabaceae	*Crotalaria distans subsp. mediocris*	LC
Fabaceae	*Crotalaria eremicola subsp. eremicola*	LC	Fabaceae	*Crotalaria globifera*	LC
Fabaceae	*Crotalaria lotoides*	LC	Fabaceae	*Crotalaria virgulata subsp. grantiana*	LC
Fabaceae	*Cullen tomentosum*	LC	Fabaceae	*Dichilus lebeckioides*	LC
Fabaceae	*Dichrostachys cinerea subsp. africana var. Africana*	LC	Fabaceae	*Dichrostachys cinerea subsp. africana var. setulosa*	LC
Fabaceae	*Dolichos angustifolius*	LC	Fabaceae	*Dolichos falciformis*	LC
Fabaceae	*Dolichos linearis*	LC	Fabaceae	*Dolichos trilobus subsp. transvaalicus*	LC
Fabaceae	*Erythrina lysistemon*	LC	Fabaceae	*Faidherbia albida*	LC
Fabaceae	*Indigastrum burkeanum*	LC	Fabaceae	*Indigastrum costatum subsp. macrum*	LC
Fabaceae	*Indigofera bainesii*	LC	Fabaceae	*Indigofera circinnata*	LC
Fabaceae	*Indigofera cryptantha var. cryptantha*	LC	Fabaceae	*Indigofera heterotricha*	LC
Fabaceae	*Indigofera hilaris var. hilaris*	LC	Fabaceae	*Indigofera holubii*	LC
Fabaceae	*Indigofera melanadenia*	LC	Fabaceae	*Indigofera oxalidea*	LC

Family	Species	Status	Family	Species	Status
Fabaceae	*Indigofera oxytropis*	LC	Fabaceae	*Indigofera schimperi var. schimperi*	LC
Fabaceae	*Indigofera vicioides var. rogersii*	LC	Fabaceae	*Indigofera vicioides var. vicioides*	LC
Fabaceae	*Lablab purpureus subsp. uncinatus*	LC	Fabaceae	*Lotononis platycarpa*	LC
Fabaceae	*Mundulea sericea subsp. sericea*	LC	Fabaceae	*Philenoptera violacea*	LC
Fabaceae	*Ptycholobium contortum*	LC	Fabaceae	*Rhynchosia caribaea*	LC
Fabaceae	*Rhynchosia hirsute*	LC	Fabaceae	*Rhynchosia minima var. prostrata*	LC
Fabaceae	*Rhynchosia totta var. totta*	LC	Fabaceae	*Rhynchosia venulosa*	LC
Fabaceae	*Schotia brachypetala*	LC	Fabaceae	*Senna italica subsp. arachoides*	LC
Fabaceae	*Sesbania sesban subsp. sesban var. Nubica*	LC	Fabaceae	*Sesbania transvaalensis*	LC
Fabaceae	*Sphenostylis angustifolia*	LC	Fabaceae	*Stylosanthes fruticosa*	LC
Fabaceae	*Tephrosia longipes subsp. longipes var. Longipes*	LC	Fabaceae	*Tephrosia multijuga*	LC
Fabaceae	*Tephrosia purpurea subsp. leptostachya var. leptostachya*	LC	Fabaceae	*Tephrosia purpurea subsp. leptostachya var. pubescens*	LC
Fabaceae	*Tephrosia rhodesica var. evansii*	LC	Fabaceae	*Tephrosia rhodesica var. rhodesica*	LC
Fabaceae	*Tephrosia semiglabra*	LC	Fabaceae	*Tephrosia villosa subsp. ehrenbergiana var. daviesii*	LC
Fabaceae	*Tephrosia villosa subsp. ehrenbergiana var. ehrenbergiana*	LC	Fabaceae	*Tephrosia zoutpansbergensis*	LC
Fabaceae	*Teramnus labialis subsp. labialis*	LC	Fabaceae	*Xanthocercis zambesiaca*	LC
Fabaceae	*Zornia glochidiata*	LC	Gentianaceae	*Sebaea grandis*	LC
Geraniaceae	*Monsonia angustifolia*	LC	Geraniaceae	*Monsonia brevirostrata*	LC
Geraniaceae	*Monsonia senegalensis*	LC	Gisekiaceae	*Gisekia africana var. africana*	LC
Hyacinthaceae	*Dipcadi glaucum*	LC	Hyacinthaceae	*Dipcadi marlothii*	LC
Hyacinthaceae	*Dipcadi platyphyllum*	LC	Hyacinthaceae	*Drimiopsis burkei subsp. burkei*	LC
Hypericaceae	*Hypericum aethiopicum subsp. sonderi*	LC	Iridaceae	*Lapeirousia bainesii*	LC
Lamiaceae	*Clerodendrum ternatum*	LC	Lamiaceae	*Endostemon tenuiflorus*	LC
Lamiaceae	*Endostemon tereticaulis*	LC	Lamiaceae	*Leonotis nepetifolia*	LC
Lamiaceae	*Leucas glabrata var. glabrata*	LC	Lamiaceae	*Leucas neuflizeana*	LC
Lamiaceae	*Leucas sexdentata*	LC	Lamiaceae	*Ocimum americanum var. americanum*	LC
Lamiaceae	*Ocimum filamentosum*	LC	Lamiaceae	*Ocimum gratissimum subsp. gratissimum var. gratissimum*	LC
Lamiaceae	*Syncolostemon elliottii*	LC	Lemnaceae	*Lemna gibba*	LC
Lobeliaceae	*Lobelia erinus*	LC	Lophiocarpaceae	*Corbichonia decumbens*	LC
Loranthaceae	*Plicosepalus kalachariensis*	LC	Lythraceae	*Nesaea drummondii*	LC
Lythraceae	*Nesaea schinzii*	LC	Malvaceae	*Abutilon angulatum var. angulatum*	LC
Malvaceae	*Abutilon fruticosum*	LC	Malvaceae	*Abutilon grandiflorum*	LC
Malvaceae	*Abutilon pycnodon*	LC	Malvaceae	*Abutilon ramosum*	LC
Malvaceae	*Adansonia digitata*	LC	Malvaceae	*Corchorus kirkii*	LC
Malvaceae	*Gossypium herbaceum subsp. africanum*	LC	Malvaceae	*Grewia bicolor var. bicolor*	LC

Family	Species	Status	Family	Species	Status
Malvaceae	*Grewia flava*	LC	Malvaceae	*Grewia flavescens*	LC
Malvaceae	*Grewia subspathulata*	LC	Malvaceae	*Grewia tenax*	LC
Malvaceae	*Grewia villosa var. villosa*	LC	Malvaceae	*Hermannia glanduligera*	LC
Malvaceae	*Hermannia modesta*	LC	Malvaceae	*Hibiscus coddii subsp. coddii*	LC
Malvaceae	*Hibiscus dongolensis*	LC	Malvaceae	*Hibiscus engleri*	LC
Malvaceae	*Hibiscus micranthus var. micranthus*	LC	Malvaceae	*Hibiscus palmatus*	LC
Malvaceae	*Hibiscus sidiformis*	LC	Malvaceae	*Melhania acuminata var. acuminata*	LC
Malvaceae	*Melhania burchellii*	LC	Malvaceae	*Melhania forbesii*	LC
Malvaceae	*Melhania rehmannii*	LC	Malvaceae	*Pavonia dentata*	LC
Malvaceae	*Sida cordifolia subsp. cordifolia*	LC	Malvaceae	*Sida ovata*	LC
Malvaceae	*Sterculia rogersii*	LC	Malvaceae	*Waltheria indica*	LC
Menispermaceae	*Cissampelos mucronata*	LC	Menispermaceae	*Tinospora fragosa*	LC
Molluginaceae	*Glinus lotoides var. virens*	LC	Molluginaceae	*Hypertelis bowkeriana*	LC
Molluginaceae	*Limeum fenestratum var. Fenestratum*	LC	Molluginaceae	*Limeum pterocarpum var. pterocarpum*	LC
Moraceae	*Ficus abutilifolia*	LC	Moraceae	*Ficus ingens*	LC
Moraceae	*Ficus sycomorus subsp. sycomorus*	LC	Moraceae	*Ficus tettensis*	LC
Myrtaceae	*Syzygium legatii*	LC	Nyctaginaceae	*Commicarpus pilosus*	LC
Nyctaginaceae	*Commicarpus plumbagineus var. Plumbagineus*	LC	Nyctaginaceae	*Phaeoptilum spinosum*	LC
Olacaceae	*Olax dissitiflora*	LC	Olacaceae	*Ximenia americana var. microphylla*	LC
Oleaceae	*Jasminum fluminense subsp. fluminense*	LC	Oleaceae	*Menodora africana*	LC
Orobanchaceae	*Alectra pumila*	LC	Orobanchaceae	*Graderia subintegra*	LC
Oxalidaceae	*Oxalis obliquifolia*	LC	Passifloraceae	*Adenia spinosa*	LC
Pedaliaceae	*Ceratotheca triloba*	LC	Pedaliaceae	*Dicerocaryum senecioides*	LC
Pedaliaceae	*Holubia saccata*	LC	Pedaliaceae	*Sesamothamnus lugardii*	LC
Pedaliaceae	*Sesamum triphyllum var. triphyllum*	LC	Phyllanthaceae	*Flueggea virosa subsp. virosa*	LC
Phyllanthaceae	*Phyllanthus asperulatus*	LC	Phyllanthaceae	*Phyllanthus incurvus*	LC
Phyllanthaceae	*Phyllanthus parvulus var. parvulus*	LC	Phyllanthaceae	*Phyllanthus reticulatus var. reticulatus*	LC
Poaceae	*Acrachne racemosa*	LC	Poaceae	*Andropogon gayanus var. polycladus*	LC
Poaceae	*Anthephora pubescens*	LC	Poaceae	*Aristida adscensionis*	LC
Poaceae	*Aristida congesta subsp. barbicollis*	LC	Poaceae	*Aristida congesta subsp. congesta*	LC
Poaceae	*Aristida meridionalis*	LC	Poaceae	*Aristida rhiniochloa*	LC
Poaceae	*Aristida scabrivalvis subsp. contracta*	LC	Poaceae	*Aristida stipitata subsp. graciliflora*	LC
Poaceae	*Bothriochloa insculpta*	LC	Poaceae	*Bothriochloa radicans*	LC
Poaceae	*Brachiaria deflexa*	LC	Poaceae	*Brachiaria nigropedata*	LC
Poaceae	*Cenchrus ciliaris*	LC	Poaceae	*Chloris pycnothrix*	LC
Poaceae	*Chloris roxburghiana*	LC	Poaceae	*Chloris virgata*	LC
Poaceae	*Coelachyrum yemenicum*	LC	Poaceae	*Dactyloctenium aegyptium*	LC

Family	Species	Status	Family	Species	Status
Poaceae	*Dactyloctenium giganteum*	LC	Poaceae	*Danthoniopsis dinteri*	LC
Poaceae	*Diandrochloa namaquensis*	LC	Poaceae	*Diandrochloa pusilla*	LC
Poaceae	*Dichanthium annulatum var. Papillosum*	LC	Poaceae	*Digitaria eriantha*	LC
Poaceae	*Digitaria perrottetii*	LC	Poaceae	*Digitaria velutina*	LC
Poaceae	*Dinebra retroflexa var. condensata*	LC	Poaceae	*Echinochloa colona*	LC
Poaceae	*Eleusine coracana subsp. africana*	LC	Poaceae	*Enneapogon cenchroides*	LC
Poaceae	*Enneapogon desvauxii*	LC	Poaceae	*Enneapogon scoparius*	LC
Poaceae	*Eragrostis aethiopica*	LC	Poaceae	*Eragrostis aspera*	LC
Poaceae	*Eragrostis barbinodis*	LC	Poaceae	*Eragrostis biflora*	LC
Poaceae	*Eragrostis capensis*	LC	Poaceae	*Eragrostis cilianensis*	LC
Poaceae	*Eragrostis heteromera*	LC	Poaceae	*Eragrostis lehmanniana var. chaunantha*	LC
Poaceae	*Eragrostis lehmanniana var. Lehmanniana*	LC	Poaceae	*Eragrostis nindensis*	LC
Poaceae	*Eragrostis porosa*	LC	Poaceae	*Eragrostis racemosa*	LC
Poaceae	*Eragrostis rigidior*	LC	Poaceae	*Eragrostis rotifer*	LC
Poaceae	*Eragrostis superb*	LC	Poaceae	*Eragrostis trichophora*	LC
Poaceae	*Eragrostis viscose*	LC	Poaceae	*Eriochloa fatmensis*	LC
Poaceae	*Eriochloa meyeriana subsp. meyeriana*	LC	Poaceae	*Fingerhuthia africana*	LC
Poaceae	*Fingerhuthia sesleriiformis*	LC	Poaceae	*Heteropogon contortus*	LC
Poaceae	*Hyparrhenia anamesa*	LC	Poaceae	*Leptocarydion vulpiastrum*	LC
Poaceae	*Lintonia nutans*	LC	Poaceae	*Melinis repens subsp. grandiflora*	LC
Poaceae	*Melinis repens subsp. repens*	LC	Poaceae	*Panicum coloratum var. coloratum*	LC
Poaceae	*Panicum maximum*	LC	Poaceae	*Pogonarthria squarrosa*	LC
Poaceae	*Schmidtia pappophoroides*	LC	Poaceae	*Setaria nigrirostris*	LC
Poaceae	*Setaria sagittifolia*	LC	Poaceae	*Setaria verticillata*	LC
Poaceae	*Sorghum bicolor subsp. drummondii*	LC	Poaceae	*Sporobolus ioclados*	LC
Poaceae	*Stipagrostis hirtigluma subsp. patula*	LC	Poaceae	*Stipagrostis uniplumis var. uniplumis*	LC
Poaceae	*Tetrapogon tenellus*	LC	Poaceae	*Tragus berteronianus*	LC
Poaceae	*Tricholaena monachne*	LC	Poaceae	*Urochloa mosambicensis*	LC
Poaceae	*Urochloa stolonifera*	LC	Poaceae	*Urochloa trichopus*	LC
Polygonaceae	*Oxygonum delagoense*	LC	Polygonaceae	*Persicaria hystricula*	LC
Polygonaceae	*Polygonum plebeium*	LC	Rhamnaceae	*Berchemia discolor*	LC
Rhamnaceae	*Ziziphus mucronata subsp. mucronata*	LC	Rubiaceae	*Anthospermum rigidum subsp. rigidum*	LC
Rubiaceae	*Gardenia volkensii subsp. volkensii var. Volkensii*	LC	Rubiaceae	*Kohautia amatymbica*	LC
Rubiaceae	*Kohautia caespitosa subsp. brachyloba*	LC	Rubiaceae	*Kohautia cynanchica*	LC
Rubiaceae	*Pentanisia angustifolia*	LC	Rubiaceae	*Psydrax livida*	LC
Rubiaceae	*Tricalysia junodii var. junodii*	LC	Salicaceae	*Dovyalis caffra*	LC

Family	Species	Status	Family	Species	Status
Salvadoraceae	*Salvadora australis*	LC	Santalaceae	*Osyris lanceolata*	LC
Sapindaceae	*Cardiospermum corindum*	LC	Sapindaceae	*Cardiospermum halicacabum var. halicacabum*	LC
Sapindaceae	*Pappea capensis*	LC	Scrophulariaceae	*Antherothamnus pearsonii*	LC
Scrophulariaceae	*Aptosimum lineare var. lineare*	LC	Scrophulariaceae	*Aptosimum lugardiae*	LC
Scrophulariaceae	*Diclis petiolaris*	LC	Scrophulariaceae	*Jamesbrittenia micrantha*	LC
Scrophulariaceae	*Manulea parviflora var. parviflora*	LC	Scrophulariaceae	*Mimulus gracilis*	LC
Scrophulariaceae	*Nemesia fruticans*	LC	Scrophulariaceae	*Peliostomum virgatum*	LC
Scrophulariaceae	*Stemodiopsis rivae*	LC	Scrophulariaceae	*Zaluzianskya elongata*	LC
Solanaceae	*Lycium cinereum*	LC	Solanaceae	*Solanum lichtensteinii*	LC
Solanaceae	*Solanum panduriforme*	LC	Solanaceae	*Solanum tettense var. renschii*	LC
Solanaceae	*Withania somnifera*	LC	Sphenocleaceae	*Sphenoclea zeylanica*	LC
Strychnaceae	*Strychnos spinosa subsp. spinosa*	LC	Thymelaeaceae	*Gnidia sericocephala*	LC
Turneraceae	*Piriqueta capensis*	LC	Vahliaceae	*Vahlia capensis subsp. vulgaris var. vulgaris*	LC
Velloziaceae	*Xerophyta humilis*	LC	Velloziaceae	*Xerophyta viscosa*	LC
Verbenaceae	*Chascanum hederaceum var. Hederaceum*	LC	Verbenaceae	*Lantana rugosa*	LC
Viscaceae	*Viscum rotundifolium*	LC	Viscaceae	*Viscum verrucosum*	LC

9 ANNEX 2. LIST OF MAMMALS

List of mammals which are likely to occur at the proposed Biotherm Alldays 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 brachyrhynchus	Short-snouted elephant shrew	LC	Associated with areas of dense grass cover with scrub bush and scattered trees	Low
Elephantulus myurus	Eastern Rock Elephant Shrew	LC	Confined to rocky koppies and piles of boulders	Low
Elephantulus intufi	Bushveld Elephant Shrew	LC	Can occupy arid areas with sparse cover provided there are scattered bushes	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	Low
Heterohyrax brucei	Yellow-spotted Rock Hyrax	LC	Rocky outcrops and similar habitats to the Rock Hyrax	Low
Lagomorpha (Hares and Rabbits):				
Lepus saxatilis	Scrub Hare	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	Definite
Pronolagus randensis	Jameson's Red Rock Rabbit	LC	Closely confined to rocky koppies, rocky kloofs and gorges.	Low
Rodentia (Rodents):				
Cryptomys hottentotus	African Mole Rat	LC	Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils	High
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	Definite
Thryonomys swinderianus	Greater Canerat	LC	Found in reed beds or in areas of dense, tall grass with thick reed of cane-like stems	Low
Pedetes capensis	Springhare	LC	Occur widely on open sandy ground or sandy scrub, on overgrazed grassland, on the fringes of vleis and dry river beds.	High
Paraxerus cepapi	Tree Squirrel	LC	Savanna woodland species	High
Graphiurus murinus	Woodland Dormouse	LC	Woodland, rocky areas and shrubland within grassland areas	High
Acomys spinosissimus	Spiny Mouse	LC	Generally associated with rocky terrain.	Low
Mus indutus	Desert Pygmy Mouse	LC	Wide habitat tolerance within areas of 200-700 mm rainfall	Moderate
Mus minutoides	Pygmy Mouse	LC	Wide habitat tolerance	Low
Mastomys natalensis	Natal Multimammate Mouse	LC	Wide habitat tolerance within areas receiving more than 400mm rainfall	High
Mastomys coucha	Southern Multimammate Mouse	LC	Wide habitat tolerance.	High

Scientific Name	Common Name	Status	Habitat	Likelihood
Thallomys paedulcus	Acacia Tree Rat	LC	Associated with stands of Acacia woodland	Low
Thallomys nigricauda	Black-tailed Tree Rat	LC	Associated with stands of Acacia woodland	Low
Aethomys chrysophilus	Red Veld Rat	LC	Grassland with some scrub cover and in savannah woodland	Low
Aethomys ineptus	Tete Veld Rat	LC	Little known, presumably grassland with some scrub cover or woodland	Low
Aethomys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially	High
Otomys angoniensis	Angoni Vlei Rat	LC	Grassland and woodland closely associated with dense reed beds, sedges and semi-aquatic grasses along vleis and river banks	Low
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
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	High
Saccostomus campestris	Pouched Mouse	LC	Catholic habitat requirements, commoner in areas where there is a sandy substrate.	High
Dendromus melanotis	Grey Climbing Mouse	LC	Often associated with stands of tall grass especially if thickened with bushes and other vegetation	Low
Steatomys pratensis	Fat Mouse	LC	Fringes of rivers and swamps in areas with sparse to tall and dense grass cover	Low
Primates:				
Galago moholi	South African Galago	LC	Savanna woodland, particularly Acacia woodland	High
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	Definite
Cercopithecus mitis	Vervet Monkey	LC	Most abundant in and near riparian vegetation of savannahs	High
Eulipotyphla (Shrews):				
Crocidura fuscomurina	Tiny Musk Shrew	LC	Dense vegetation usually near water	Low
Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
Crocidura hirta	Lesser Red Musk Shrew	LC	Catholic habitat requirements	High
Erinaceomorpha (Hedgehog)				
Atelerix frontalis	South African Hedgehog	LC	Generally found in semi-arid and subtemperate environments with ample ground cover	Low
Philodota (Pangolins)				
Smutsia temminckii	Ground Pangolin	LC	Savanna species which does not occur in grasslands, forests or desert	Low
Carnivora:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	High
Hyaena brunnea	Brown Hyaena	NT	Nama and Succulent Karoo and the drier parts of the Grassland and Savanna Biomes	Low
Crocuta crocuta	Spotted Hyaena		Predominantly a savanna species	Low
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	Low

Scientific Name	Common Name	Status	Habitat	Likelihood
			forest	
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.	Moderate
Leptailurus serval	Serval	LC	Adequate cover and water are essential habitat requirements	Low
Civettictis civetta	African Civet	LC	Forest and well watered savanna	Moderate
Genetta genetta	Small-spotted genet	LC	Occur in open arid associations	High
Genetta tigrina	Large-spotted genet	LC	Fynbos and savanna particularly along riverine areas	High
Paracynictis selousi	Selous' Mongoose	LC	Savanna species	High
Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Low
Galerella sanguinea	Slender Mongoose	LC	Catholic habitat requirements but does not occur in the south.	High
Atilax paludinosus	Marsh Mongoose	LC	Associated with well-watered terrain, living in close association with rivers, streams, marshes, etc.	Low
Mungos mungo	Banded Mongoose	LC	Wide habitat tolerance but do not occur in desert	High
Helogale parvula	Dwarf Mongoose	LC	Savanna species associated with semi-desert and dry open woodland	High
Canis mesomelas	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	High
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	High
Poecilogale albinucha	African Striped Weasel	LC	Primarily a savanna species that have an annual rainfall of more than 600 mm, although they have been recorded from drier areas.	High
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	Definite
Mellivora capensis	Ratel/Honey Badger	IUCN LC/SA RDB EN	Catholic habitat requirements	High
SUIFORMES (Pigs):				
Potamochoerus larvatus	Bushpig	LC	Forest, thickets, riparian undercover, reed beds etc	High
Phacochoerus africanus	Common Warthog	LC	Open woodland and bushveld	Definite
Rumanantia (Antelope):				
Tragelaphus strepsiceros	Greater Kudu	LC	Broken, rocky terrain with a cover of woodland and a nearby water supply.	Definite
Tragelaphus angasii	Nyala	LC	Thickets in dry savanna woodland	Low
Tragelaphus scriptus	Bushbuck	LC	Riverine or other types or underbrush near water	High
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	High
Redunca arundinum	Southern Reedbuck	LC	Tall grass or reed beds with a supply of water	Low
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Definite
Raphicerus sharpei	Sharpe's Grysbok	LC	Low growing scrub and grass of medium height	High
Chiroptera (Bats)				
Epomophorus wahlbergi	Wahlberg's Epauletted Fruit Bat	LC	Savanna, woodland and forest margins	High
Epomophorus gambianus crypturus	Gambian Epauletted Fruit Bat	LC	Occurrence dependent on the availability of fruitbearing trees	Moderate
Rousettus aegyptiacus	Egyptian Rousette	LC	Require fruit and caves for roosting in the vicinity	High
Taphozous perforatus	Egyptian Tomb Bat	LC	Associated with open woodland.	Low
Sauromys petrophilus	Flat-headed free-tailed bat	LC	Rocky areas and the availability of narrow rock fissures essential requirements	High

Scientific Name	Common Name	Status	Habitat	Likelihood
Mops midas	Midas Free Tailed Bat	LC	All records are from the savannah biome	Low
Pipistrellus capensis	Cape Serotine Bat	LC	Wide habitat tolerances, but often found near open water	High
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	In arid areas. often associated with water sources	High
Nycteris thebaica	Egyptian Slit-faced Bat	LC	Wide habitat tolerance	High
Miniopterus schreibersii	Schreibers' long-fingered bat	NT	Cave dwelling and suitable caves are an essential habitat requirement	High
Pipistrellus rusticus	Rusty Pipistrelle	LC	Savanna woodland	High
Neoromicia nanus	Banana Bat	LC	Forest and woodland savanna	Low
Neoromicia zuluensis	Aloe Serotine Bat	LC	Savanna woodland	Low
Myotis tricolor	Temminck's hairy Bat	LC	Occurrence may be governed by the presence of caves	Low
Glauconycteris variegata	Butterfly Bat	LC	Savanna, particularly associated with open woodland.	Low
Scotophilus dinganii	African Yellow Bat	LC	Savanna woodland species	High
Nycteris schlieffenii	Schlieffen's Bat	LC	Wide habitat tolerance	Low
Kervoula lanosa	Lesser Woolly Bat	LC	Tends to be associated with riverine vegetation in arid areas	Low
Nycteris woodi	Wood's Slit-faced Bat	LC	Savanna woodland	Low
Rhinolophus hildebrandtii	Hildebrandt's Horseshoe Bat	LC	Savanna woodland	High
Rhinolophus clivosus	Geoffroy's horsehoe bat	LC	Wide habitat tolerance but roost in caves	Low
Rhinolophus darlingi	Darling's Horsehoe Bat	LC	Savanna woodland species but requires caves	High
Eidolon helvum	Straw-coloured fruit bat	LC	Occasional migratory visitors within southern Africa	Low
Rhinolophus landeri	Lander's Horseshoe Bat	LC	Savanna woodland particularly riverine associations	Low
Rhinolophus simulator	Bushveld Horseshoe Bat	LC	Savanna woodland dependent on the availability of substantial shelter in caves and mine shafts	High

10 ANNEX 3. LIST OF REPTILES

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

Scientific Name	Common Name	Distribution	Status	Habitat	Likelihood
Tortoises and Terrapins:					
Kinixys spekii	Speke's Hinged Tortoise	Widespread	Data Deficient	Savannah, coastal forest and dune forest	High
Pelomedusa subrufa	Marsh Terrapin	Widespread	Data Deficient	Slow-moving & still water, incl temporary pans	Low
Pelusios sinuatus	Serrated Hinged Tortoise	Widespread	Data Deficient	Perennial rivers, lakes and pans	Low
Snakes:					
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Endemic	Data Deficient	Varied: semi-desert, coastal bush, fynbos & savannah	High
Rhinotyphlops schlegelii	Schlegel's Beaked Blind Snake	Endemic	Data Deficient	Coastal forest to moist savannah	Low
Typhlops bibronii	Bibron's Blind Snake	Endemic	Data Deficient	Coastal forest, moist savannah and grassland	Moderate
Leptotyphlops longicaudus	Long-tailed Worm Snake	Widespread	Data Deficient	Moist savanna	High
Leptotyphlops scutifrons	Peters' Thread Snake	Widespread	Data Deficient	Varied, including coastal forest, moist and dry savanna, grassland and karoo scrub	High
Leptotyphlops incognitus	Incognito Worm Snake	Widespread	Data Deficient	Fossorial in lowland forest to moist savanna	High
Leptotyphlops distanti	Distant's Worm Snake	Endemic	Data Deficient	Coastal forest to moist savannah	Low
Lycodonomorphus rufulus	Common Water Snake	Endemic	Data Deficient	Temperate distribution from the southwestern Cape	Low
Lamprophis capensis	Brown House Snake	Widespread	Data Deficient	Common in highveld grassland & arid karroid regions, but found everywhere & tolerant of urban sprawl	High
Lamprophis swazicus	Swazi Rock Snake	Endemic	SA RDB Rare	Restricted to moist savanna	Low
Lycophidion capense	Common Wolf Snake	Widespread	Data Deficient	Lowland forest and fynbos to moist savanna, grassland and karoo scrub	High
Lycophidion variegatum	Variegated Wolf Snake	Widespread	Data Deficient	Rocky outcrops in moist savanna	Low
Mehelya capensis	Southern File Snake	Widespread	Data Deficient	Lowland forest and moist savanna	Low
Mehelya nyassae	Black File Snake	Widespread	Data Deficient	Lowland forest and moist savanna	Low
Pseudaspis cana	Mole Snake	Widespread	Data Deficient	Sandy scrubland in SW Cape, highveld grassland & mountainous & desert regions	High
Duberria lutrix	Common Slug Eater	Widespread	LC	Largely grassland but also moist savanna, lowland forest and fynbos	Low
Amplorhinus multimaculatus	Many-spotted Snake	Widespread	Data Deficient	Reed beds and riverside vegetation in fynbos	
Prosymna stuhlmannii	East African Shovel-snout	Widespread	Data Deficient	Lowland forest and moist savanna	Low

Scientific Name	Common Name	Distribution	Status	Habitat	Likelihood
Prosymna sundevalli	Sundevall's Shovel-Snout	Endemic	Data Deficient	Dry areas, incl savannah woodlands, highveld & karroid areas, entering valley bushveld & fynbos in the Cape	High
Prosymna bivittata	Two-striped Shovel-snout		Data Deficient	Acacia savannah entering sandveld	Low
Philothamnus semivariegatus	Spotted Bush Snake	Widespread	Data Deficient	River banks, shrubs or rocky regions in karoo scrub. Also savanna and lowland forest.	High
Psammophylax tritaeniatus	Striped Skaapsteker	Widespread	LC	Open grassland, arid or moist savanna and karoo scrub	High
Hemirhagerrhis nototaenia	Eastern Bark Snake	Widespread	Data Deficient	Savannah, lowland forest	Low
Psammophis mossambicus	Olive Whip Snake	Widespread	Data Deficient	Moist savanna and lowland forest	Low
Psammophis brevirostris	Short-snoued Whip Snake	Widespread	Data Deficient	Grassland, moist savanna and lowland forest	Low
Psammophis trinasalis	Kalahari Sand Snake	Widespread	Data Deficient	Mainly Kalahari thornveld but may also occur in savanna and grassland	Low
Psammophis subtaeniatus	Western Strip-bellied Sand Snake	Widespread	Data Deficient	Arid savanna, especially in mopane and acacia veld	High
Psammophis angolensis	Dwarf Whip Snake	Widespread	Data Deficient	Moist savanna	Low
Dasypeltis scabra	Common/Rhombic Egg Eater	Widespread	LC	Absent only from true desert & closed-canopy forest	High
Amblyodipsas polylepis	Common Purple-glossed Snake	Widespread	Data Deficient	Forest to moist savanna	Low
Python natalensis	Souther African Python	Widespread	Vulnerable	Prefers rocky outcrops in arid and moist savanna	Low
Aparallactus capensis	Black-headed Centipede-eater	Widespread	Data Deficient	Old termite mounds in lowland forest, savanna and grassland	High
Crotaphopeltis hotamboeia	Herald Snake	Widespread	Data Deficient	Terrestrial but more common in wetlands	Low
Telescopus semiannulatus	Eastern Tiger Snake	Widespread	Data Deficient	Desert to Karoo, savanna and forest	High
Dispholidus typus	Boomslang	Widespread	Data Deficient	Widespread arboreal species	High
Thelotornis capensis	Vine Snake	Widespread	Data Deficient	Trees and shrubs in lowland forest and savanna	High
Atractaspis bobronii	Southern stiletto Snake	Widespread	Data Deficient	Wide variety of habitats	High
Rhamphiophis rostratus	Rufous Beaked Snake	Widespread	Data Deficient	Bushveld or thorny sandveld areas in moist savanna	High
Aspidelaps scutatus	Shield-nose Snake	Widespread	Data Deficient	Sandy and stony regions of moist and arid savanna	High
Elapsoidea boulengeri	Boulenger's Garter Snake	Widespread	Data Deficient	Mesic savannah	Low
Elapsoidea sundervalli	Sundevall's Garter Snake	Endemic	Data Deficient	Coastal forest, sanannah, highveld grassland	Medium
Naja annulifera	Snouted Cobra	Widespread	Data Deficient	Arid and moist savannah	High
Maja mossambica	Mozambique Spitting Cobra	Widespread	Data Deficient	Moist savanna and lowland forest	Low
Bitis arietans	Puff Adder	Widespread	Data Deficient	Absent only from desert & mnt tops	High

Scientific Name	Common Name	Distribution	Status	Habitat	Likelihood
Bitis rhombeatus	Rhombic Night Adder	Widespread	Data Deficient	Damp environments in moist savannahs, lowland forest and fynbos	High
Causus defilippii	Snouted Night Adder	Widespread	Data Deficient	Usually found close to water in moist savanna, lowland forest and grassland	Moderate
Dendroaspis polylepis	Black Mamba	Widespread	Data Deficient	Dry and moist savanna	High
Worm Lizards					
Chirindia langi	Lang's Round-headed Worm Lizard	Endemic	Data Deficient	Sandy Kalahari soil, entering mopane woodland on clay soil	High
Monopeltis sphenorhynchus	Slender Spade-snouted Worm Lizard	Widespread	Data Deficient	Deep Kalahari sand or coastal alluvium	Low
Lizard and Skinks:					
Acontias percivali	Percival's Legeless Skink	Endemic	Data Deficient	Mesic coastal thicket and savannah	Low
Lygosoma sundevallii	Sundevall's Writhing Skink	Widespread	Data Deficient	Arid sandy areas and well drained hillsides	High
Mabuya quinquetaeniata	Rainbow Skink	Widespread	Data Deficient	Mesic and arid savannah	High
Mabuya sulcata	Western Rock Skink	Widespread	Data Deficient	Karroid areas	High
Mabuya varia	Variable Skink	Widespread	Data Deficient	Grassland to arid and mesic savanna	High
Mabuya variegata	Variegated Skink	Widespread	Data Deficient	Extremely varied; desert, karroid veld, montane grassland, savanna, coastal bush & valley bushveld	High
Ichnotropis capensis	Cape Rough-scaled Lizard	Widespread	Data Deficient	Arid and mesic savannah	High
Ichnotropis squamulosa	Common Rough-scaled Lizard	Widespread	Data Deficient	Arid and mesic savannah	Definite
Australolacerta rupicola	Soutpansberg Rock Lizard	Endemic	SARDB Restricted	Sparsely vegetated mountain summits	Low
Panaspis maculicoliis	Spotted-neck Snake-eyed Skink	Widespread	Data Deficient	Arid and mesic savannah	High
Heliobolus lugubris	Bushveld Lizard	Widespread	Data Deficient	Arid and mesic savannah	High
Nucras intertexta	Spotted Sandveld Lizard	Widespread	Data Deficient	Arid savanna usually on kalahari sand	High
Nucras holubi	Holub's Sandveld Lizard	Widespread	Data Deficient	Broken rocky ground in mesic savanna	Low
Nucras taeniolata	Ornate Sandveld Lizard	Widespread	Data Deficient	Open grassland, arid or moist savanna and valley bushveld	High
Pedioplanis lineoocellata	Spotted Sand Lizard	Endemic	Data Deficient	Very varied: karroid veld, valley bushveld & arid & mesic savannah	High
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	Widespread	Data Deficient	Montane grassland, savanna, bushveld and low open coastal forest	High
Gerrhosaurus major	Rough-scaled Plated Lizard	Widespread	Data Deficient	Arid and mesic savannah	High
Gerrhosaurus validus	Giant Plated Lizard	Widespread	Data Deficient	Arid and mesic savannah	High
Cordylus tropidosternum	Tropical Girdled Lizard	Widespread	Data Deficient	Dry lowveld particularly mopane savanna	High
Varanus albigularis	Rock Monitor	Widespread	Data Deficient	Savanna and arid karroid areas	High
Varanus niloticus	Water Monitor	Widespread	Data Deficient	Rivers pans and major lakes	High
Agama armata	Peter's Ground Agama	Widespread	Data Deficient	Mesic and sandveld savannah	Low

Scientific Name	Common Name	Distribution	Status	Habitat	Likelihood
Acanthocercus atricollis	Southern Tree Agama	Widespread	Data Deficient	Open savanna	High
Chameleons:					
Chamaeleo dilepis	Flap-neck Chameleon	Widespread	Data Deficient	Prefers savannah woodland	High
Geckos:			Data Deficient		
Pachydactylus affinis	Transvaal Thick-toed Gecko	Endemic	Data Deficient	Rocky outcrops and dead termite nests in highveld grassland	Moderate
Pachydactylus capensis	Cape Thick-toed Gecko	Widespread	Data Deficient	Karroid veld, grassland and mesic savannah	High
Pachydactylus turneri	Turner's Thick-toed Gecko	Widespread	Data Deficient	Semi-desert and arid savannah	High
Pachydactylus punctatus	Speckled Thick-toed Gecko	Widespread	Data Deficient	Dry savannah	High
Pachydactylus tigrinus	Tiger Thick-toed Gecko	Endemic	Data Deficient	Mesic savannah	Low
Hemidactylus mabouia	Morcau's Tropical House Gecko	Widespread	Data Deficient	Coastal bush, mesic and arid savannah	High
Homopholis wahlbergii	Wahlberg's Velvet Gecko	Widespread	Data Deficient	Coastal bush, mesic and arid savannah	High
Lygodactylus capensis	Cape Dwarf Gecko	Widespread	Data Deficient	Well-wooded savanna and thicket	High
Lygodactylus stevensoni	Stenvenson's Dwarf Gecko	Narrow Endemic	Data Deficient	Well-wooded granite hills	Low

11 ANNEX 4. LIST OF AMPHIBIANS

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

Scientific Name	Common Name	Status	Habitat	Distribution	Likelihood
Breviceps adspersus	Bushveld Rain Frog	Not Threatened	Sandy to sandy loam soils in semi-arid habitats in savanna and grassland	Widespread	High
Amietophrynus garmani	Eastern Olive Toad	Not Threatened	Vleis and pans in bushveld savannah	Widespread	Low
Amietophrynus gutturalis	Guttural Toad	Not Threatened	Around open pools, dams, vleis and other semi-permanent or permenent water	Widespread	Low
Amietophrynus maculatus	Flat-backed Toad	Not Threatened	Shallow static or slow moving water in lowveld grassland and savanna	Widespread	Low
Poyntonophrynus fenoulheti	Northern Pygmy Toad	Not Threatened	Associated with rocky outcrops in savannah bushveld	Widespread	Low
Schismaderma carens	Red Toad	Not Threatened	Widespread in savanna and woodland	Widespread	High
Hemisus guineensis	Guinea Shovel-nosed Frag	Not Threatened	Temporary pans formed during the rainy season in grassland and savanna	Widespread	Low
Hemisus marmoratus	Mottled Shovel-nosed Frog	Not Threatened	Marshy ground and sandy riverbanks in bushveld savanna	Widespread	Low
Hyperolius marmoratus	Painted Reed Frog	Not Threatened	Reeds and other vegetation around water in savanna, grassland and forest	Widespread	Low
Phrynomantis bifasciatus	Banded Rubber Frog	Not Threatened	Hot semi-arid and subtropical environments	Widespread	High
Phrynobatrachus mababiensis	Dwarf Puddle Frog	Not Threatened	Open woodland savanna and sometimes grassland	Widespread	Low
Phrynobatrachus natalensis	Snoring Puddle Frog	Not Threatened	Along margins of permanent and temporary water bodies	Widespread	Low
Hildebrandtia ornata	Ornate Frog	Not Threatened	Burrowing species found in a variety of savannah types	Widespread	Low
Ptychadena anchietae	Plain Grass Frog	Not Threatened	Widely distributed in Savanna	Widespread	Low
Ptychadena mossambica	Broad-banded Grass Frog	Not Threatened	Variety of bushveld vegetation types	Widespread	Low
Pyxicephalus adspersus	Giant Bullfrog	Near Threatened	Breed in shallow margins of rain-filled depressions.	Widespread	Low
Pyxicephalus edulis	African Bullfrog	Not Threatened	Shallow temporary pans and mashy areas in open savanna woodland		Low
Xenopus laevis	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	Low
Cacosternum boettgeri	Common Caco	Not Threatened	Marshy areas, vleis and shallow pans	Widespread	Low
Amietia angolensis	Common River Frog	Not Threatened	Banks of slow-flowing streams or permanent bodies of water	Widespread	Low

Scientific Name	Common Name	Status	Habitat	Distribution	Likelihood
Strongylopus fasciatus	Striped Stream Frog	Not Threatened	Open grassy areas near dams, ponds or streams	Widespread	Low
Tomopterna cryptotis	Tremelo Sand Frog	Not Threatened	Savanna and grassland	Widespread	High
Tomopterna krugerensis	Knocking Sand Frog	Not Threatened	Variety of habitats in savanna. Breeds in temporary rain pools and pans	Widespread	High
Tomopterna marmorata	Russet-backed sand Frog	Not Threatened	Various habitats in subtropical savanna	Widespread	Low
Tomopterna natalensis	Natal Sand Frog	Not Threatened	Variety of the habitats in savvannah and grassland	Endemic	Low
Tomopterna tandyi	Tandy's Sand Frog	Not Threatened	Nama karoo grassland and savanna	Widespread	Low
Chiromantis xerampelina	South African Foam Nest Frog	Not Threatened	Found around seasonal or permanent bodies of open water in bushveld savanna	Widespread	Low

12 ANNEX 5. LIST OF BIRDS

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

Family	Species	Status	Family	Species	Status
Accipitridae	*Accipiter badius*	LC	Accipitridae	*Accipiter minullus*	LC
Accipitridae	*Accipiter ovampensis*	LC	Accipitridae	*Accipiter tachiro*	LC
Accipitridae	*Aquila nipalensis*	LC	Accipitridae	*Aquila pennatus*	LC
Accipitridae	*Aquila pomarina*	LC	Accipitridae	*Aquila rapax*	VU
Accipitridae	*Aquila spilogaster*	LC	Accipitridae	*Aquila verreauxii*	LC
Accipitridae	*Aquila wahlbergi*	LC	Accipitridae	*Buteo vulpinus*	LC
Accipitridae	*Circaetus cinereus*	LC	Accipitridae	*Circaetus pectoralis*	LC
Accipitridae	*Circus macrourus*	NT	Accipitridae	*Elanus caeruleus*	LC
Accipitridae	*Gypohierax angolensis*	LC	Accipitridae	*Gyps africanus*	VU
Accipitridae	*Gyps coprotheres*	VU	Accipitridae	*Haliaeetus vocifer*	LC
Accipitridae	*Kaupifalco monogrammicus*	LC	Accipitridae	*Lophaetus occipitalis*	LC
Accipitridae	*Melierax canorus*	LC	Accipitridae	*Melierax gabar*	LC
Accipitridae	*Melierax metabates*	LC	Accipitridae	*Necrosyrtes monachus*	VU
Accipitridae	*Pernis apivorus*	LC	Accipitridae	*Polemaetus bellicosus*	VU
Accipitridae	*Polyboroides typus*	LC	Accipitridae	*Terathopius ecaudatus*	VU
Accipitridae	*Torgos tracheliotus*	LC	Accipitridae	*Trigonoceps occipitalis*	LC
Accipitridae	*Milvus migrans*	LC	Accipitridae	*Milvus aegyptius*	LC
Alaudidae	*Calendulauda africanoides*	LC	Alaudidae	*Calendulauda sabota*	LC
Alaudidae	*Eremopterix leucotis*	LC	Alaudidae	*Eremopterix verticalis*	LC
Alaudidae	*Mirafra Africana*	LC	Alaudidae	*Mirafra passerina*	LC
Alaudidae	*Pinarocorys nigricans*	LC	Anatidae	*Alopochen aegyptiacus*	LC
Anatidae	*Anas erythrorhyncha*	LC	Anatidae	*Anas hottentota*	LC
Anatidae	*Anas sparsa*	LC	Anatidae	*Anas undulata*	LC
Anatidae	*Dendrocygna bicolor*	LC	Anatidae	*Dendrocygna viduata*	LC
Anatidae	*Netta erythrophthalma*	LC	Anatidae	*Nettapus auritus*	NT
Anatidae	*Plectropterus gambensis*	LC	Anatidae	*Sarkidiornis melanotos*	LC
Anatidae	*Thalassornis leuconotus*	LC	Anhingidae	*Anhinga rufa*	LC
Apodidae	*Apus affinis*	LC	Apodidae	*Apus apus*	LC
Apodidae	*Apus caffer*	LC	Apodidae	*Apus horus*	LC
Apodidae	*Cypsiurus parvus*	LC	Apodidae	*Tachymarptis melba*	LC
Ardeidae	*Ardea cinerea*	LC	Ardeidae	*Ardea goliath*	LC
Ardeidae	*Ardea melanocephala*	LC	Ardeidae	*Ardea purpurea*	LC
Ardeidae	*Ardeola ralloides*	LC	Ardeidae	*Bubulcus ibis*	LC
Ardeidae	*Butorides striata*	LC	Ardeidae	*Egretta alba*	LC
Ardeidae	*Egretta ardesiaca*	LC	Ardeidae	*Egretta garzetta*	LC
Ardeidae	*Egretta intermedia*	LC	Ardeidae	*Ixobrychus sturmii*	LC

Family	Species	Status	Family	Species	Status
Ardeidae	*Nycticorax nycticorax*	LC	Bucerotidae	*Bucorvus leadbeateri*	VU
Bucerotidae	*Tockus erythrorhynchus*	LC	Bucerotidae	*Tockus leucomelas*	LC
Bucerotidae	*Tockus nasutus*	LC	Buphagidae	*Buphagus erythrorhynchus*	NT
Burhinidae	*Burhinus capensis*	LC	Burhinidae	*Burhinus vermiculatus*	LC
Campephagidae	*Campephaga flava*	LC	Campephagidae	*Coracina pectoralis*	LC
Capitonidae	*Lybius torquatus*	LC	Capitonidae	*Pogoniulus chrysoconus*	LC
Capitonidae	*Trachyphonus vaillantii*	LC	Capitonidae	*Tricholaema leucomelas*	LC
Caprimulgidae	*Caprimulgus europaeus*	LC	Caprimulgidae	*Caprimulgus fossii*	LC
Caprimulgidae	*Caprimulgus pectoralis*	LC	Caprimulgidae	*Caprimulgus rufigena*	LC
Caprimulgidae	*Caprimulgus tristigma*	LC	Charadriidae	*Charadrius hiaticula*	LC
Charadriidae	*Charadrius marginatus*	LC	Charadriidae	*Charadrius pecuarius*	LC
Charadriidae	*Charadrius tricollaris*	LC	Charadriidae	*Vanellus albiceps*	NT
Charadriidae	*Vanellus armatus*	LC	Charadriidae	*Vanellus coronatus*	LC
Charadriidae	*Vanellus lugubris*	LC	Ciconiidae	*Anastomus lamelligerus*	NT
Ciconiidae	*Ciconia abdimii*	LC	Ciconiidae	*Ciconia ciconia*	LC
Ciconiidae	*Ciconia episcopus*	NT	Ciconiidae	*Ciconia nigra*	NT
Ciconiidae	*Ephippiorhynchus senegalensis*	EN	Ciconiidae	*Leptoptilos crumeniferus*	NT
Ciconiidae	*Mycteria ibis*	NT	Coliidae	*Colius striatus*	LC
Coliidae	*Urocolius indicus*	LC	Columbidae	*Columba guinea*	LC
Columbidae	*Oena capensis*	LC	Columbidae	*Streptopelia capicola*	LC
Columbidae	*Streptopelia decipiens*	LC	Columbidae	*Streptopelia semitorquata*	LC
Columbidae	*Streptopelia senegalensis*	LC	Columbidae	*Treron calvus*	LC
Columbidae	*Turtur chalcospilos*	LC	Coraciidae	*Coracias caudatus*	LC
Coraciidae	*Coracias garrulus*	LC	Coraciidae	*Coracias naevius*	LC
Coraciidae	*Eurystomus glaucurus*	LC	Corvidae	*Corvus albus*	LC
Cuculidae	*Centropus burchellii*	LC	Cuculidae	*Chrysococcyx caprius*	LC
Cuculidae	*Chrysococcyx klaas*	LC	Cuculidae	*Clamator glandarius*	LC
Cuculidae	*Clamator jacobinus*	LC	Cuculidae	*Clamator levaillantii*	LC
Cuculidae	*Cuculus canorus*	LC	Cuculidae	*Cuculus clamosus*	LC
Cuculidae	*Cuculus gularis*	LC	Cuculidae	*Cuculus solitarius*	LC
Dicruridae	*Dicrurus adsimilis*	LC	Estrildidae	*Amadina erythrocephala*	LC
Estrildidae	*Amadina fasciata*	LC	Estrildidae	*Estrilda astrild*	LC
Estrildidae	*Estrilda erythronotos*	LC	Estrildidae	*Granatina granatina*	LC
Estrildidae	*Lagonosticta rhodopareia*	LC	Estrildidae	*Lagonosticta senegala*	LC
Estrildidae	*Ortygospiza atricollis*	LC	Estrildidae	*Pytilia melba*	LC
Estrildidae	*Uraeginthus angolensis*	LC	Falconidae	*Falco amurensis*	LC
Falconidae	*Falco biarmicus*	NT	Falconidae	*Falco naumanni*	VU
Falconidae	*Falco rupicolus*	LC	Falconidae	*Falco rupicoloides*	LC
Fringillidae	*Crithagra atrogularis*	LC	Fringillidae	*Crithagra mozambicus*	LC
Fringillidae	*Emberiza flaviventris*	LC	Fringillidae	*Emberiza impetuani*	LC
Fringillidae	*Emberiza tahapisi*	LC	Glareolidae	*Cursorius temminckii*	LC

Family	Species	Status	Family	Species	Status
Glareolidae	*Rhinoptilus chalcopterus*	LC	Glareolidae	*Rhinoptilus cinctus*	LC
Gruidae	*Grus paradisea*	VU	Halcyonidae	*Alcedo cristata*	LC
Halcyonidae	*Ceryle rudis*	LC	Halcyonidae	*Halcyon albiventris*	LC
Halcyonidae	*Halcyon chelicuti*	LC	Halcyonidae	*Halcyon leucocephala*	LC
Halcyonidae	*Halcyon senegalensis*	LC	Halcyonidae	*Ispidina picta*	LC
Halcyonidae	*Megaceryle maximus*	LC	Hirundinidae	*Delichon urbicum*	LC
Hirundinidae	*Hirundo abyssinica*	LC	Hirundinidae	*Hirundo dimidiata*	LC
Hirundinidae	*Hirundo fuligula*	LC	Hirundinidae	*Hirundo rustica*	LC
Hirundinidae	*Hirundo semirufa*	LC	Hirundinidae	*Hirundo smithii*	LC
Hirundinidae	*Riparia paludicola*	LC	Hirundinidae	*Riparia riparia*	LC
Indicatoridae	*Indicator indicator*	LC	Indicatoridae	*Indicator minor*	LC
Indicatoridae	*Prodotiscus regulus*	LC	Jacanidae	*Actophilornis africanus*	LC
Laniidae	*Corvinella melanoleuca*	LC	Laniidae	*Eurocephalus anguitimens*	LC
Laniidae	*Lanius collaris*	LC	Laniidae	*Lanius collurio*	LC
Laniidae	*Lanius minor*	LC	Laniidae	*Prionops plumatus*	LC
Laniidae	*Prionops retzii*	LC	Laridae	*Chlidonias hybrida*	LC
Laridae	*Chlidonias leucopterus*	LC	Laridae	*Larus cirrocephalus*	LC
Malaconotidae	*Dryoscopus cubla*	LC	Malaconotidae	*Laniarius aethiopicus*	LC
Malaconotidae	*Laniarius atrococcineus*	LC	Malaconotidae	*Malaconotus blanchoti*	LC
Malaconotidae	*Nilaus afer*	LC	Malaconotidae	*Tchagra australis*	LC
Malaconotidae	*Tchagra senegalus*	LC	Malaconotidae	*Telophorus sulfureopectus*	LC
Meropidae	*Merops apiaster*	LC	Meropidae	*Merops bullockoides*	LC
Meropidae	*Merops hirundineus*	LC	Meropidae	*Merops nubicoides*	LC
Meropidae	*Merops persicus*	LC	Meropidae	*Merops pusillus*	LC
Motacillidae	*Anthus caffer*	LC	Motacillidae	*Anthus cinnamomeus*	LC
Motacillidae	*Anthus hoeschi*	LC	Motacillidae	*Anthus leucophrys*	LC
Motacillidae	*Anthus vaalensis*	LC	Motacillidae	*Motacilla aguimp*	LC
Motacillidae	*Motacilla capensis*	LC	Muscicapidae	*Batis molitor*	LC
Muscicapidae	*Bradornis mariquensis*	LC	Muscicapidae	*Bradornis pallidus*	LC
Muscicapidae	*Melaenornis pammelaina*	LC	Muscicapidae	*Muscicapa caerulescens*	LC
Muscicapidae	*Muscicapa striata*	LC	Muscicapidae	*Myioparus plumbeus*	LC
Muscicapidae	*Sigelus silens*	LC	Muscicapidae	*Stenostira scita*	LC
Muscicapidae	*Terpsiphone viridis*	LC	Musophagidae	*Corythaixoides concolor*	LC
Nectariniidae	*Chalcomitra amethystina*	LC	Nectariniidae	*Cinnyris mariquensis*	LC
Nectariniidae	*Cinnyris talatala*	LC	Nectariniidae	*Hedydipna collaris*	LC
Numididae	*Numida meleagris*	LC	Oriolidae	*Oriolus auratus*	LC
Oriolidae	*Oriolus larvatus*	LC	Oriolidae	*Oriolus oriolus*	LC
Otididae	*Ardeotis kori*	VU	Otididae	*Lophotis ruficrista*	LC
Pandionidae	*Pandion haliaetus*	LC	Paridae	*Parus cinerascens*	LC
Paridae	*Parus niger*	LC	Pelecanidae	*Pelecanus onocrotalus*	NT
Phalacrocoracidae	*Phalacrocorax africanus*	LC	Phalacrocoracidae	*Phalacrocorax carbo*	LC

Family	Species	Status	Family	Species	Status
Phasianidae	*Coturnix coturnix*	LC	Phasianidae	*Coturnix delegorguei*	LC
Phasianidae	*Dendroperdix sephaena*	LC	Phasianidae	*Peliperdix coqui*	LC
Phasianidae	*Pternistis natalensis*	LC	Phasianidae	*Pternistis swainsonii*	LC
Phoenicopteridae	*Phoenicopterus ruber*	NT	Phoeniculidae	*Phoeniculus purpureus*	LC
Phoeniculidae	*Rhinopomastus cyanomelas*	LC	Picidae	*Campethera abingoni*	LC
Picidae	*Campethera bennettii*	LC	Picidae	*Dendropicos fuscescens*	LC
Picidae	*Dendropicos namaquus*	LC	Plataleidae	*Bostrychia hagedash*	LC
Plataleidae	*Platalea alba*	LC	Plataleidae	*Plegadis falcinellus*	LC
Plataleidae	*Threskiornis aethiopicus*	LC	Ploceidae	*Anaplectes melanops*	LC
Ploceidae	*Bubalornis niger*	LC	Ploceidae	*Euplectes albonotatus*	LC
Ploceidae	*Euplectes orix*	LC	Ploceidae	*Passer diffusus*	LC
Ploceidae	*Passer domesticus*	LC	Ploceidae	*Passer melanurus*	LC
Ploceidae	*Passer motitensis*	LC	Ploceidae	*Petronia superciliaris*	LC
Ploceidae	*Plocepasser mahali*	LC	Ploceidae	*Ploceus cucullatus*	LC
Ploceidae	*Ploceus intermedius*	LC	Ploceidae	*Ploceus ocularis*	LC
Ploceidae	*Ploceus velatus*	LC	Ploceidae	*Quelea quelea*	LC
Ploceidae	*Sporopipes squamifrons*	LC	Ploceidae	*Anaplectes melanops*	LC
Podicipedidae	*Podiceps nigricollis*	LC	Podicipedidae	*Tachybaptus ruficollis*	LC
Psittacidae	*Poicephalus meyeri*	LC	Pteroclididae	*Pterocles bicinctus*	LC
Pteroclididae	*Pterocles burchelli*	LC	Pycnonotidae	*Chlorocichla flaviventris*	LC
Pycnonotidae	*Phyllastrephus terrestris*	LC	Pycnonotidae	*Pycnonotus nigricans*	LC
Pycnonotidae	*Pycnonotus tricolor*	LC	Rallidae	*Amaurornis flavirostris*	LC
Rallidae	*Crecopsis egregia*	LC	Rallidae	*Fulica cristata*	LC
Rallidae	*Gallinula angulata*	LC	Rallidae	*Gallinula chloropus*	LC
Recurvirostridae	*Himantopus himantopus*	LC	Recurvirostridae	*Recurvirostra avosetta*	LC
Remizidae	*Anthoscopus caroli*	LC	Remizidae	*Anthoscopus minutus*	LC
Rostratulidae	*Rostratula benghalensis*	NT	Sagittariidae	*Sagiatarius serpentarius*	NT
Scolopacidae	*Actitis hypoleucos*	LC	Scolopacidae	*Calidris ferruginea*	LC
Scolopacidae	*Calidris fuscicollis*	LC	Scolopacidae	*Calidris minuta*	LC
Scolopacidae	*Gallinago nigripennis*	LC	Scolopacidae	*Tringa glareola*	LC
Scolopacidae	*Tringa nebularia*	LC	Scolopacidae	*Tringa stagnatilis*	LC
Scopidae	*Scopus umbretta*	LC	Strigidae	*Bubo africanus*	LC
Strigidae	*Bubo lacteus*	LC	Strigidae	*Glaucidium perlatum*	LC
Strigidae	*Otus senegalensis*	LC	Strigidae	*Ptilopsus granti*	LC
Strigidae	*Scotopelia peli*	VU	Struthionidae	*Struthio camelus*	LC
Sturnidae	*Cinnyricinclus leucogaster*	LC	Sturnidae	*Creatophora cinerea*	LC
Sturnidae	*Lamprotornis chalybaeus*	LC	Sturnidae	*Lamprotornis mevesii*	LC
Sturnidae	*Lamprotornis nitens*	LC	Sturnidae	*Onychognathus morio*	LC
Sylviidae	*Acrocephalus arundinaceus*	LC	Sylviidae	*Acrocephalus baeticatus*	LC
Sylviidae	*Acrocephalus gracilirostris*	LC	Sylviidae	*Acrocephalus palustris*	LC
Sylviidae	*Acrocephalus schoenobaenus*	LC	Sylviidae	*Apalis flavida*	LC

Family	Species	Status	Family	Species	Status
Sylviidae	*Apalis thoracica*	LC	Sylviidae	*Calamonastes fasciolatus*	LC
Sylviidae	*Camaroptera brachyura*	LC	Sylviidae	*Camaroptera brevicaudata*	LC
Sylviidae	*Cisticola aridulus*	LC	Sylviidae	*Cisticola chiniana*	LC
Sylviidae	*Cisticola erythrops*	LC	Sylviidae	*Cisticola fulvicapilla*	LC
Sylviidae	*Cisticola juncidis*	LC	Sylviidae	*Cisticola textrix*	LC
Sylviidae	*Cisticola tinniens*	LC	Sylviidae	*Eremomela icteropygialis*	LC
Sylviidae	*Eremomela scotops*	LC	Sylviidae	*Eremomela usticollis*	LC
Sylviidae	*Hippolais icterina*	LC	Sylviidae	*Hippolais olivetorum*	LC
Sylviidae	*Parisoma subcaeruleum*	LC	Sylviidae	*Phylloscopus trochilus*	LC
Sylviidae	*Prinia flavicans*	LC	Sylviidae	*Prinia subflava*	LC
Sylviidae	*Sylvia borin*	LC	Sylviidae	*Sylvia communis*	LC
Sylviidae	*Sylvietta rufescens*	LC	Timaliidae	*Turdoides bicolor*	LC
Timaliidae	*Turdoides jardineii*	LC	Turdidae	*Cercomela familiaris*	LC
Turdidae	*Cercotrichas leucophrys*	LC	Turdidae	*Cercotrichas paena*	LC
Turdidae	*Cossypha heuglini*	LC	Turdidae	*Cossypha humeralis*	LC
Turdidae	*Myrmecocichla formicivora*	LC	Turdidae	*Oenanthe pileata*	LC
Turdidae	*Psophocichla litsipsirupa*	LC	Turdidae	*Thamnolaea cinnamomeiventris*	LC
Turdidae	*Turdus libonyanus*	LC	Turnicidae	*Turnix sylvaticus*	LC
Tytonidae	*Tyto alba*	LC	Upupidae	*Upupa africana*	LC
Viduidae	*Vidua chalybeata*	LC	Viduidae	*Vidua macroura*	LC
Viduidae	*Vidua paradisaea*	LC	Viduidae	*Vidua regia*	LC

SHORT CV OF CONSULTANT:

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SUMMARY OF EXPERTISE:

SIMON TODD

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

Skills & Primary Competencies

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

Tertiary Education:

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

Employment History

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

General Experience & Expertise

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

A selection of recent work is as follows:

Specialist Assessments:

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

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

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

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

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

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

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

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

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

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

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

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

Research Reports & Peer Reviewed Publications:

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

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

Todd, S.W. 2009. Field-Based Assessment of Degradation in the Namakwa District. Final Report. Mapping Degradation in the Arid Subregions of the BIOTA South Transect. SANBI.

Todd, S.W. 2009. A fence-line in time demonstrates grazing-induced vegetation shifts and dynamics in the semi-arid Succulent Karoo. *Ecological Applications*, 19: 1897–1908.

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Todd, S.W. 2006. Gradients in vegetation cover, structure and species richness of Nama-Karoo shrublands in relation to distance from livestock watering points. *Journal of Applied Ecology* 43: 293-304.

Benito, G., Rohde, R., Seely, M., Külls, C., Dahan, O., Enzel, Y., **Todd, S**. Botero, B., Morin, E., Grodek, T., Roberts, C. 2010. Management of Alluvial Aquifers in Two Southern African Ephemeral Rivers: Implications for IWRM. *Water Resources Management*, 24:641–667.

Hahn, B.D., Richardson, F.D., Hoffman, M.T., Roberts, R., **Todd, S.W.** and Carrick, P.J. 2005. A simulation model of long-term climate, livestock and vegetation interactions on communal rangelands in the semi-arid Succulent Karoo, Namaqualand, South Africa*. Ecological Modelling* 183, 211–230.

Malgas, R.R., Potts, A.J., Oettlé, N.M., Koelle, B., **Todd, S.W.**, Verboom G.A. & Hoffman M.T.. 2010. Distribution, quantitative morphological variation and preliminary molecular analysis of different growth forms of wild rooibos (*Aspalathus linearis*) in the northern Cederberg and on the Bokkeveld Plateau. *South African Journal of Botany*, 76, 72-81.

Mills, A., Fey, M., Donaldson, J.D., **Todd, S.W**. & Theron, L.J. 2009. Soil infiltrability as a driver of plant cover and species richness in the semi-arid Karoo, South Africa. *Plant and Soil* 320: 321–332.

Rahlao, J.S., Hoffman M.T., **Todd, S.W**. & McGrath, K. 2008. Long-term vegetation change in the Succulent Karoo, South Africa following 67 years of rest from grazing. *Journal of Arid Environments*, 72, 808-819.

Hoffman, M.T. & **Todd, S.W.** 2010. Using Fixed-Point Photography, Field Surveys, And Gis To Monitor Environmental Change: An Example From Riemvasmaak, South Africa. Chapter In *Repeat Photography: Methods And Applications In The Natural Sciences.* R.H. Webb, Editor. Island Press. In Press.