

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED SAN SOLAR PV  
DEVELOPMENT AND ASSOCIATED INFRASTRUCTURE NEAR KATHU, NORTHERN CAPE:

**FAUNA & FLORA SPECIALIST EIA PHASE REPORT**



savannah  
environmental

**PRODUCED FOR SAVANNAH ENVIRONMENTAL**

**BY**



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## **EXECUTIVE SUMMARY**

San Solar Energy Facility (Pty) Ltd proposes the development of the San Solar PV facility, a photovoltaic (PV) solar energy facility and associated infrastructure, on a site located approximately 16km north west of Kathu in the Northern Cape Province. The solar PV facility will be developed on the Remaining extent of the Farm Wincanton 472 and comprise several arrays of PV panels and associated infrastructure with a contracted capacity of up to 100MW. The proposed development is currently in the EIA Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity EIA phase study of the project site as part of the EIA process.

A field assessment as well as previous studies on the same site and a desktop review of the available ecological information for the area were used in order to identify and characterise the ecological features of the project site. This information is used to derive an ecological sensitivity map which has been used to inform the layout of the development. In terms of the site verification, a flora compliance statement, faunal compliance statement and a full combined terrestrial biodiversity assessment were found to be the appropriate levels of study.

In terms of the combined terrestrial biodiversity assessment, there are no CBAs within the site, but there are extensive areas of ESA within the site that cannot be avoided and which would be lost to the development. The site verification indicates that there are no visible differences between the areas classified as ESA and those areas classified as "Other Natural Areas". The majority of the site consists of bush-encroached Kathu Bushveld, and not more open *Vachelia erioloba*-dominated savannah which typically occurs on the deeper sands of the area and which is present in the south of the site. This community is considered to represent a more sensitive habitat than the encroached areas or the areas of shallow soils in general, with the result that the sensitivity and ecological value of the habitat within the development footprint is considered to be relatively low. As the site does not appear to be within an area of high significance in terms of ecological processes and connectivity, the loss of the ESA to development is considered acceptable and has been assessed as being of low significance after mitigation.

In terms of the flora compliance statement, the site was confirmed as being of low sensitivity. The vegetation of the site consists in intact Kathu Bushveld. This is however not the more typical *Vachelia erioloba* savannah community, but rather consists of encroached bush dominated by *Senegalia mellifera* subsp. *detinens*. No red-listed plant species were observed at the site and the density of protected tree species was low with only *Vachelia erioloba* and *Boscia albitrunca* being present at low density. The development would not compromise the local populations of these species in any way. Sensitive areas present at the site that have been avoided under the final development footprint include the pans and the area of dense *Vachelia erioloba* in the south-east of the site. Given the low sensitivity of the development

footprint and the avoidance of the sensitive habitats present at the site, there are no reasons that the development should not go ahead from a plant ecology perspective.

In terms of the fauna compliance statement, the site was confirmed as being of low sensitivity for fauna. The bushveld habitat at the site is considered to be low sensitivity as it is encroached by *Senegalia mellifera*, and there are not likely to be any species of concern resident on the site. Although there are no faunal habitats present at the site which are considered to be high sensitivity, the pans and the deeper red sands in the south-east of the site are considered to be moderate sensitivity for fauna, but have been avoided under the assessed layout. Given the low sensitivity of the development footprint and the avoidance of the sensitive faunal habitats present at the site, there are no reasons that the development should not go ahead from an animal ecology perspective.

*Impact Statement*

There are no impacts on terrestrial biodiversity associated with the development of the San Solar PV development and Grid Connection that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation be implemented, this development is deemed acceptable from a terrestrial ecological impact perspective. In terms of cumulative impacts, the contribution of the current project is considered acceptable, largely as a result of the context of the site and the low sensitivity of the affected area. It is thus the reasoned opinion of the specialist that there the San Solar PV development and Grid Connection development should be authorised subject to the various mitigation and avoidance measures as indicated.

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**COMPLIANCE WITH APPENDIX 6 OF THE 2014 EIA REGULATIONS, AS AMENDED**

Requirements of Appendix 6 – GN R326 2014 EIA Regulations, 7 April 2017	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	6
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	7
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 3
g) an identification of any areas to be avoided, including buffers;	Section 3
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.3
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 3
k) any mitigation measures for inclusion in the EMPr;	Section 5
l) any conditions for inclusion in the environmental authorisation;	Section 5
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 5
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 6
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	See Main Report
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See Main Report
q) any other information requested by the competent authority.	
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

**SHORT CV/SUMMARY OF EXPERTISE – SIMON TODD**

 <p><b>3Foxes Biodiversity Solutions</b> <b>ECOLOGICAL SPECIALIST SERVICES</b> Assessment/Management/Research</p>	<p>Simon Todd Pr.Sci.Nat Director &amp; Principle Scientist C: 082 3326502 O: 021 782 0377 Simon.Todd@3foxes.co.za 60 Forrest Way Glencairn 7975</p>	<p>Ecological Solutions for People &amp; the Environment</p>
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Simon Todd is Director and principal scientist at 3Foxes Biodiversity Solutions and has over 20 years of experience in biodiversity measurement, management and assessment. He has provided specialist ecological input on more than 200 different developments distributed widely across the country. This includes input on the Wind and Solar SEA (REDZ) as well as the Eskom Grid Infrastructure (EGI) SEA and Karoo Shale Gas SEA. He is on the National Vegetation Map Committee as representative of the Nama and Succulent Karoo Biomes. Simon Todd is a recognised ecological expert and is a past chairman and current deputy chair of the Arid-Zone Ecology Forum. He is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

A selection of recent work is as follows:

**Strategic Environmental Assessments**

- Co-Author. Chapter 7 - Biodiversity & Ecosystems - Shale Gas SEA. CSIR 2016.
- Co-Author. Chapter 1 Scenarios and Activities – Shale Gas SEA. CSIR 2016.
- Co-Author – Ecological Chapter – Wind and Solar SEA. CSIR 2014.
- Co-Author – Ecological Chapter – Eskom Grid Infrastructure SEA. CSIR 2015.
- Contributor – Ecological & Conservation components to SKA SEA. CSIR 2017.

**Recent Specialist Ecological Studies in the Vicinity of the Current Site**

- Kathu Solar PV Facility. Fauna and Flora EIA Process. Cape EAPrac 2015.
- Mogobe Solar PV Facility. Fauna and Flora EIA Proces. Cape EAPrac 2015.
- Logoko Solar PV Facility. Fauna and Flora EIA Proces. Cape EAPrac 2015.
- RE Capital 10 Solar Power Plant, Postmasburg. Fauna and Flora EIA Proces. Cape EAPrac 2015.
- Walk-through study of Kumba Iron Ore expansion area at Dingleton, Northern Cape. MSA Group. 2017.
- Adams PV Project – EIA process and follow-up vegetation survey. Aurora Power Solutions. 2016.
- Mamatwane Compilation Yard. Fauna and Flora EIA process. ERM. 2013.
- Olifantshoek-Emil 132kV power line. Fauna and Flora BA process. Savannah Environmental 2017.

**SPECIALIST DECLARATION**

I, ..Simon Todd....., as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:  \_\_\_\_\_

Name of Specialist: \_\_\_\_ Simon Todd \_\_\_\_\_

Date: \_\_\_\_ 15 June 2022 \_\_\_\_\_



# **1 INTRODUCTION**

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San Solar Energy Facility (Pty) Ltd proposes the development of the San Solar PV facility, a photovoltaic (PV) solar energy facility and associated infrastructure, on a site located approximately 16km north west of Kathu in the Northern Cape Province. The solar PV facility will be developed on the Remaining extent of the Farm Wincanton 472 and comprise several arrays of PV panels and associated infrastructure with a contracted capacity of up to 100MW. The proposed development is currently in the EIA Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity EIA phase study of the project site as part of the Scoping and Environmental Impact Assessment (EIA) process.

The purpose of the San Solar PV Development Terrestrial Biodiversity EIA Phase Report is to describe and detail the ecological features of the project site, provide an assessment of the ecological sensitivity of the project site, and identify the likely impacts that would be associated with the proposed development area as a SEF. Previous assessments of the site as well as a desktop review of the available ecological information for the area were used in order to identify and characterise the ecological features of the project site. This information is used to derive an ecological sensitivity map which has been used to inform the layout of the development. An assessment of impacts associated with the pre-construction, construction, operation, and decommissioning phases of the development is provided. A variety of avoidance and mitigation measures associated with each identified impact are recommended to reduce the likely impact of the development, which should be included in the EMPr for the development. Finally, a statement is made as to the general ecological acceptability of the San Solar PV Facility and whether or not the development should be approved on terrestrial ecological grounds is provided.

## ***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 environment may be affected by the proposed development
- 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 the proposed 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 (EIS) which contains:
    - a summary of the key findings of the EIA;
    - an assessment of the positive and negative implications of the proposed development;
    - a comparative assessment of the positive and negative implications of identified alternatives.

**General Considerations:**

- Disclose any gaps in information or assumptions made.
- Identify recommendations for mitigatory measures to minimise impacts.
- Outline additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the EMPr for faunal related issues.

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

- Preconstruction
- Construction
- Operational Phase

**1.1 ASSESSMENT APPROACH & PHILOSOPHY**

This assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 982, as amended) in terms of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA), as well as the recently promulgated notice issued in terms of NEMA, "*National Environmental Management Act, 1998 (Act No. 107 Of 1998): Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation [G 43110 – GN 320]*"

In terms of NEMA, this assessment demonstrates how the proponent intends to comply with the principles contained in Section 2 of NEMA, which amongst other things, indicates that environmental management should:

- (In order of priority) aim to: avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity;
- Avoid degradation of the environment;
- Avoid jeopardising ecosystem integrity;
- Pursue the best practicable environmental option by means of integrated environmental management;
- Protect the environment as the people's common heritage;
- Control and minimise environmental damage; and
- Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic or stressed ecosystems.

Furthermore, in terms of best practice guidelines as outlined by Brownlie (2005) and De Villiers *et al.* (2005), a precautionary and risk-averse approach should be adopted for projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning in threatened ecosystems or designated sensitive areas: i.e. CBAs/ESAs (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas (FEPA).

In order to adhere to the above principles and best-practice guidelines, the following approach forms the basis for the study approach and assessment philosophy:

- The study includes data searches, desktop studies, site walkovers / field survey of the property and baseline data collection, describing:
  - The broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of **pattern**, the following will be identified or described:

**Community and ecosystem level**

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, fine-scale systematic conservation plans, etc*).

**Species level**

- Species of Conservation Concern (SCC) (giving location if possible using GPS);
- The viability of an estimated population size of the SCC species that are present (including the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident);
- The likelihood of other Red Data Book species, or SCC, occurring in the vicinity (include degree of confidence).

**Fauna**

- Describe and assess the terrestrial fauna present in the area that will be affected by the proposed development;
- Conduct a faunal assessment that can be integrated into the ecological study;
- Describe the existing impacts of current land use as they affect the fauna;
- Clarify species of special concern and that are known to be:

- endemic to the region;
  - that are considered to be of conservational concern;
  - that are in commercial trade (CITES listed species); or
  - are of cultural significance.
- Provide monitoring requirements as input into the EMPr for faunal related issues.

**Other pattern issues**

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity’.
- The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of **process**, the following will be identified and/or described:

- The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries).
- Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
- Furthermore, any further studies that may be required during or after the EIA process will be outlined.
- All relevant legislation, permits and standards that would apply to the development will be identified.
- The opportunities and constraints for development will be described and shown graphically on an aerial photograph, satellite image or map delineated at an appropriate level of spatial accuracy.

**1.2 RELEVANT ASPECTS OF THE DEVELOPMENT**

The study area falls within the Gamagara Local Municipality within the John Taolo Gaetsewe District Municipality. The site is located east of Deben and is accessible via the R380 provincial route which branches off the N14 National Road, approximately 3km south of Kathu. A facility development area of 400 ha, which will include the PV facility (200 ha), BESS and a 132kV facility substation to be connected via a Loop-in-Loop out (LILO) connection to the Umtu

132kV overhead power line has been located within the study area. The infrastructure associated with this 100MW PV facility includes:

- PV modules and mounting structures
- Inverters and transformers
- Cabling between the panels, to be laid underground where practical.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Laydown area.
- Operation and Maintenance buildings including a gate and security building, control centre, offices, warehouse, and workshop areas for maintenance and storage.
- Grid connection solution including a 132kV facility substation to be connected via a Loop-in-Loop out (LILO) connection to the Umtu 132kV overhead power line (located ~5km south of the site).

## **2 METHODOLOGY**

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### **2.1 DATA SOURCING AND REVIEW**

Data sources from the literature consulted and used where necessary in the study includes the following:

#### *Vegetation:*

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (2018 update).
- Information on plant and animal species recorded for the wider area was extracted from the South African Biodiversity Information Facility (SABIF)/ SANBI Integrated Biodiversity Information System (SIBIS) database hosted by the South African National Biodiversity Institute (SANBI). Data was extracted for a significantly larger area than the study area, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself has not been well sampled in the past.
- The International Union for Conservation of Nature (IUCN) conservation status 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 (2022).

#### *Ecosystem:*

- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel *et al.* 2011) as well as the 2018 NBA.

- Critical Biodiversity Areas (CBAs) were extracted from the Northern Cape Critical Biodiversity Areas Map (Oosthuysen & Holness 2016).

#### *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 the ADU databases (ReptileMap, Frogmap and MammalMap) <http://vmus.adu.org.za>.
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, EWT & SANBI (2016) and Skinner and Chimimba (2005) for mammals.
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as an assessment of the availability and quality of suitable habitat at the site.
- The conservation status of mammals is based on the IUCN Red List Categories (EWT/SANBI 2016), while reptiles are based on the South African Reptile Conservation Assessment (Bates *et al.* 2013) and amphibians on Minter *et al.* (2004) as well as the IUCN (2020).

## **2.2 SITE VISITS & FIELD ASSESSMENT**

A site visit to the site was conducted over two days on the 21<sup>st</sup> and 22<sup>nd</sup> of April 2022. During the site visit, the different biodiversity features, habitat, and landscape units present at the site were identified and mapped in the field. Specific features visible on the satellite imagery of the site such as pans were also marked for field inspection and were verified and assessed during the site visit. Walk-through-surveys were conducted within representative areas across the site and all plant and animal species observed were recorded. Active searches for reptiles and amphibians were also conducted within habitats likely to harbour or be important for such. The presence of sensitive habitats such as SCC, stands of large trees, pans or rocky outcrops were noted in the field where present and recorded and mapped on a GPS.

In addition to the current field assessment, the site has been previously assessed in 2012 (Strohbach 2012) for a solar development on the same site and also included a walk-through report conducted in 2013 (Strohbach 2013). The results of these studies are used to inform the current study as appropriate.

## **2.3 SENSITIVITY MAPPING & ASSESSMENT**

An ecological sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in the literature and various spatial databases with mapping based on the satellite imagery and the results of the field assessment. This includes delineating different habitat units mapped and assigning sensitivity values to the units based

on their ecological properties, conservation value and the observed 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** – Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. 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. These areas usually comprise the bulk of habitats within an area. 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. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High/No-Go** – 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 as much as possible.

#### **2.4 SAMPLING LIMITATIONS AND ASSUMPTIONS**

The current study is informed by a specific field assessment for the current study as well as the previous field assessment and desktop study. This serves to significantly reduce the limitations and assumptions required for the study. In addition to the previous EIA study, there was also a walk-through study for the site that includes an estimate of the numbers of protected trees present within the original development footprint. Conditions at the time of the current field assessment are considered to be optimal as the field assessment followed better than average rainfall with the result that the vegetation of the site was green and in an excellent condition for sampling. Overall, the information collected on-site is considered reliable and there are few limitations with regards to the vegetation sampling and the timing of the site visits.

In terms of fauna, detailed studies were not conducted for the Scoping study, but several factors reduce the uncertainty associated with the assessment. Species presence is inferred based on results obtained from previous studies the consultant has conducted in the vicinity of the current study area, including several adjacent properties with similar habitat to the current site. Many remote areas have not been well-sampled in the past with the result that



the species lists derived from the available spatial databases for the area do not always adequately reflect the actual fauna present at the project site. This is acknowledged as a limitation of the study, however, it is substantially reduced given the previous experience in the area. In order to further reduce this limitation, and ensure a conservative approach, the species lists derived for the project site from the literature were obtained from an area significantly larger than the project site and are likely to include a much wider array of species than actually occur at the project site. This is a cautious and conservative approach which takes the study limitations into account.

## **2.5 DFFE SITE VERIFICATION**

Government Notice No. 320, dated 20 March 2020, includes the requirement that an Initial Site Sensitivity Verification Report must be produced for a development footprint. The outcomes of the Site Verification Report determine the level of assessment required for the site. The outputs of the Screening Tool are illustrated and briefly discussed below for each theme as relevant to the current study.

### *Animal Species Theme*

The DFFE Screening Tool identified the San Solar site as having a medium and low animal sensitivity theme for the site. This is due to the potential presence of the Secretarybird *Sagittarius serpentarius* at the site. However, since avifauna are dealt with in a separate specific report, the site is therefore considered to be low sensitivity for terrestrial mammals.

The outputs of the Screening Tool are based on existing biodiversity information, which for many rural areas such as the San Solar site, is sparse, with the result that this consists largely of modelled data and the potential presence of species of concern which need to be verified through the field assessment and site verification exercise.

Although the Screening Tool did not identify any listed mammals for the site, there are five listed terrestrial mammal species that potentially occur in the area. These are the Brown Hyaena *Hyaena brunnea* (Near Threatened), Black-footed Cat *Felis nigripes* (Vulnerable), Leopard *Panthera pardus* (VU), Ground Pangolin *Smutsia temminckii* (Vulnerable) and South African Hedgehog *Atelerix frontalis* (Vulnerable). The Leopard and Brown Hyaena are not likely to occur in the area on account of the agricultural land-use in the area which is not usually conducive to the persistence of large carnivores. The Black-footed Cat is a secretive species which would be likely to occur in the wider area and possibly at the project site given that it occurs within arid, open country. The Hedgehog and Ground Pangolin may also occur in the area at typically low density. Given the extensive national ranges of these species, the impact of the proposed development on habitat loss for these species would be minimal and

a long-term impact on these species would be unlikely. As a result, the site is considered to be low sensitivity for these species.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

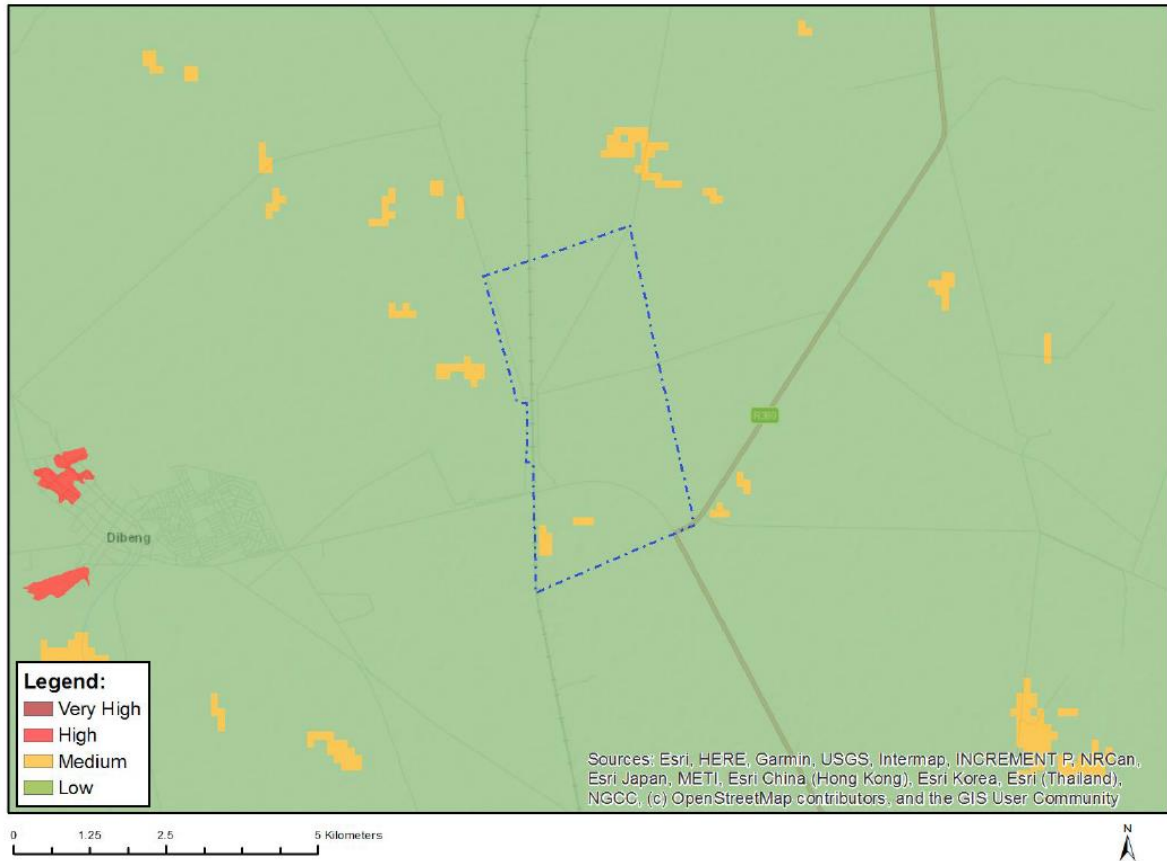


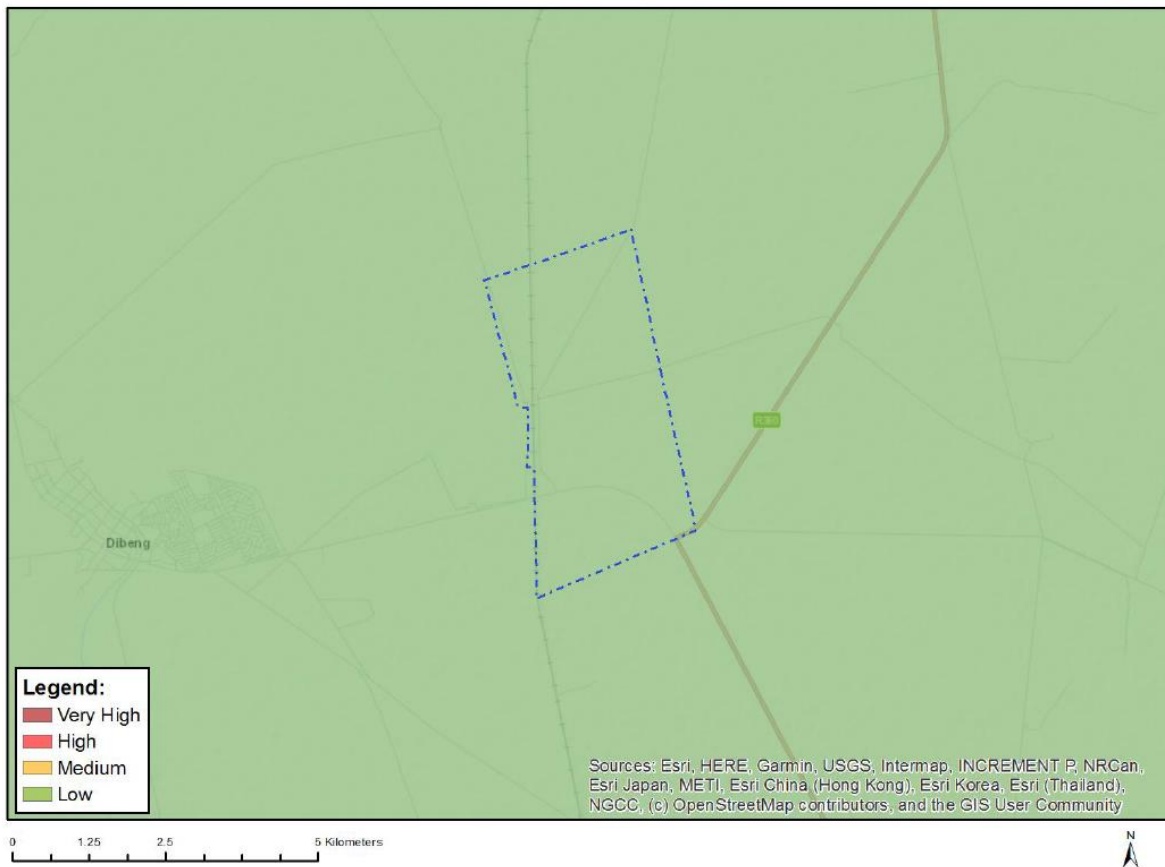
Figure 1. Animal Species Theme Sensitivity Map for the San Solar site.

Table 1. Animal Species Theme Features for the San Solar site.

Sensitivity	Feature(s)
Medium	<i>Aves-Sagittarius serpentarius</i>

Plant Species Theme

## MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



**Figure 2.** Plant Species Theme Sensitivity Map for the San Solar site.

There are no botanical sensitivities known from the area (Figure 2). Although there are several protected species present on the site such as *Vachelia erioloba* and *Boscia albitrunca*, neither of these species are listed. Thus, the site is confirmed to be low sensitivity from a botanical perspective.

#### *Relative Terrestrial Biodiversity Theme*

The Relative Terrestrial Biodiversity theme for San Solar site indicates that the site consists largely of High Sensitivity areas related to the presence of Ecological Support Areas at the site (Figure 3 and Table 2).

**Table 2.** Terrestrial Biodiversity Theme Features for the San Solar site.

Sensitivity	Features
Low	Low Sensitivity
Very High	Ecological Support Area

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



**Figure 3.** Terrestrial Biodiversity Theme Sensitivity Map for the San Solar site.

*Conclusions Regarding the DFFE Screening Tool Outputs and the outcome of the Site Verification.*

Due to the fact that the site contains areas of High sensitivity in terms of the Terrestrial Biodiversity Theme, a Terrestrial Biodiversity Impact Assessment as outlined within the “*The Assessment And Reporting Of Impacts On Terrestrial Animal Species For Activities Requiring*

*Environmental Authorisation* must be undertaken and the protocols for this assessment should be followed. In terms of the Plant Species Protocol and Animal Species Protocol, the site is located in a low sensitivity area, with the result that a faunal species compliance statement and a plant species compliance statement must be compiled for the study.

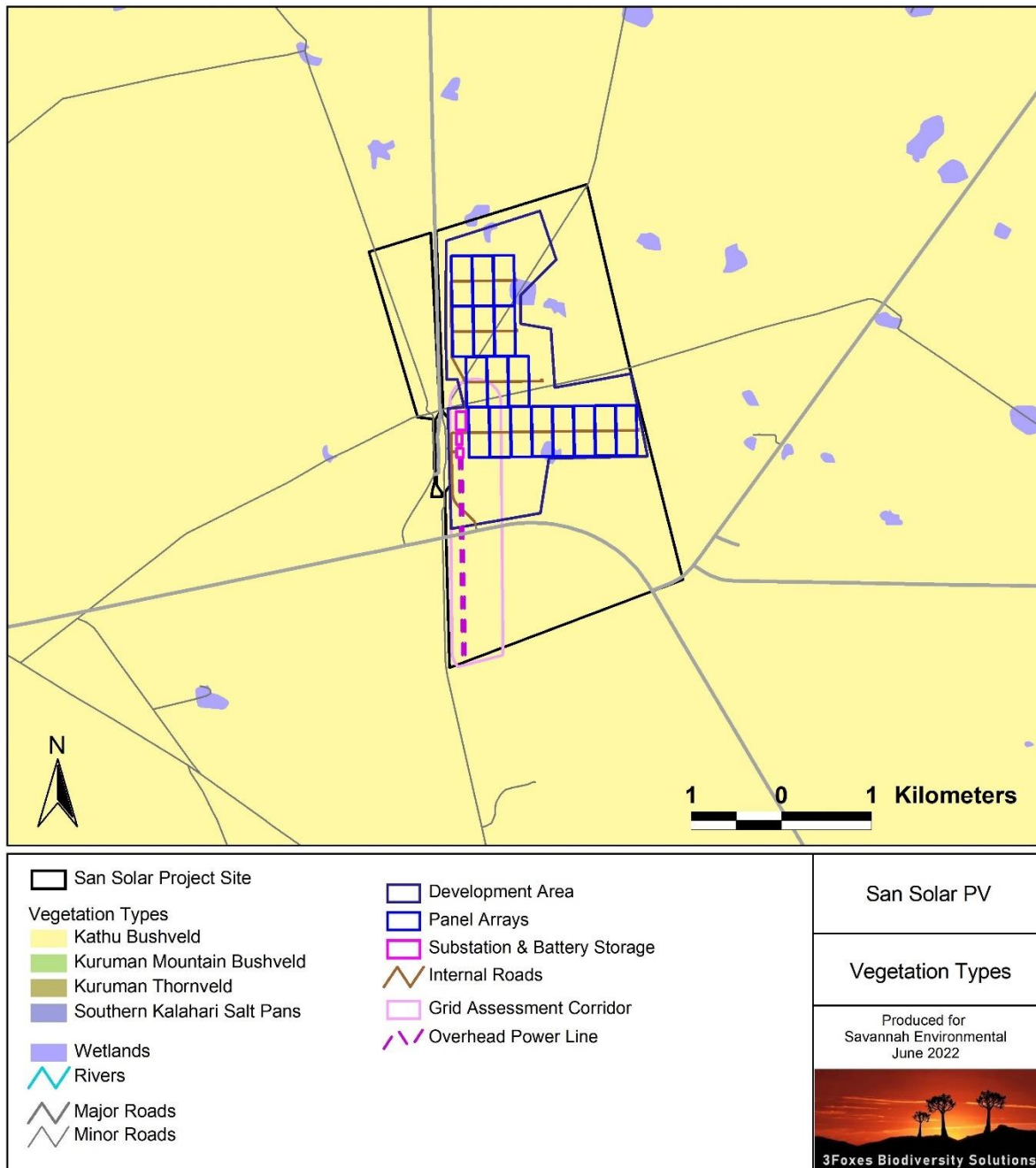
In terms of the required compliance statements, the plant and animal compliance statements are detailed below. Details on the limitations, field assessment and approach are outlined in Section 2, while the site baseline description and recommended inputs for the EMPr are detailed in the appropriate sections below.

### **3 Plant Species Baseline**

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#### **3.1 BROAD-SCALE VEGETATION PATTERNS**

According to the national vegetation map (Mucina & Rutherford 2006), the project site is restricted to the Kathu Bushveld vegetation type (Figure 4). This vegetation unit occupies an area of 7 443 km<sup>2</sup> and extends from around Kathu and Dibeng in the south through Hotazel and to the Botswana border between Van Zylsrus and McCarthysrus. In terms of soils the vegetation type is associated with aeolian red sand and surface calcrete and deep sandy soils of the Hutton and Clovelly soil forms. The main land types are Ah and Ae with some Ag. The Kathu Bushveld vegetation type is still considered largely intact and less than 2% has been transformed by mining activity and other development, and it is classified as Least Threatened. However, there has been a recent increase in mining as well as solar development within this vegetation type with the result that it has experienced significant recent habitat loss as well as become increasingly fragmented. It is also poorly conserved and does not currently fall within any formal conservation areas apart from the recently declared Kumba Iron Ore offset areas west of Kathu. Other vegetation types that occur in the wider area include Kuruman Thornveld to the east and Kuruman Mountain Bushveld to the south and east, neither of which is of conservation concern or occur within the project site.



**Figure 4.** Broad-scale overview of the vegetation in and around the San Solar site. The site is restricted to the Kathu Bushveld vegetation type with several pans.

### 3.2 FINE-SCALE VEGETATION PATTERNS

The majority of the site consists of dense Kathu Bushveld, dominated by *Senegalia mellifera* subsp. *detinens*, *Vachellia hebeclada*, *Zizyphus mucronata*, *Tarchonanthus camphoratus* with scattered *Vachellia erioloba*. The grass layer was dense across most of the site following the



high rainfall the area had experienced. Common and dominant grass species include *Enneapogon cenchroides*, *Aristida stipitata* subsp. *stipitata*, *Stipagrostis uniplumis* var. *uniplumis*, *Schmidtia pappophoroides*, *Chenchrus ciliaris*, *Aristida meridionalis*, *Stipagrostis obtusa*, *Cynodon dactylon*, *Heteropogon contortus*, *Enneapogon desvauxii*, *Eragrostis lehmanniana* and *Aristida congesta* subsp. *congesta*. Common shrubs present include *Searsia ciliata*, *Ehretia rigida* subsp. *rigida*, *Cadaba aphylla*, *Diospyros lycioides* subsp. *lycioides*, *Grewia flava*, *Asparagus laricinus*, *Asparagus retrofractus*, *Felicia muricata* subsp. *cinerascens*, *Pentzia calcarea*, *Blepharis capensis*, *Leucas capensis*, *Chrysocoma ciliata*, *Melolobium candicans*, and *Hermannia tomentosa*. Forbs included *Dicoma schinzii*, *Senna italica*, *Geigeria ornativa*, *Indigofera daleoides* var. *daleoides* and *Gisekia pharnacioides* var. *pharnacioides*.

Three communities can be recognised within the Kathu Bushveld vegetation type, the typical type as illustrated below in Figure 5, is considered low sensitivity and has a low density of protected species. In the south-east of the site, there is an area of deeper red sands dominated by *Vachelia erioloba*, which is considered high sensitivity and has been excluded from the development footprint. There are also scattered areas across the site where the soil is shallow, exposing the underlying calcrete and which have a lower vegetation and tree density. These areas are not considered to be sensitive as they have a low density of protected tree species.



**Figure 5.** Typical vegetation of the San Solar site within the PV footprint. The vegetation is considered to be bush-encroached with *Senegalia mellifera* and has a low density of *Vachelia erioloba*.





**Figure 6.** There are some parts of the site where the soil is shallow with exposed calcrete. In these areas, the grass layer is reduced and the vegetation is more open. These areas are not considered sensitive.



**Figure 7.** The south-eastern corner of the site has an area of deeper sands which have a relatively high density of *Vachelia erioloba*. This area has been excluded from the development footprint.



Apart from the Kathu Bushveld which characterises the site, the only other habitat present are occasional pans scattered across the site. One of the larger pans is pictured below in Figure 8 and is dominated by species such as *Cynodon dactylon*, *Eragrostis echinochloidea*, *Enneapogon cenchroides*, *Alternanthera pungens*, as well as several alien species including *Tagetes minuta*, *Verbesina encelioides*, *Datura stramonium*, *Argemone ochroleuca* and *Prosopis glandulosa*. Given the ecological role that pans play in the landscape, these are considered sensitive features that are not suitable for development. There are no pans within the final development footprint.

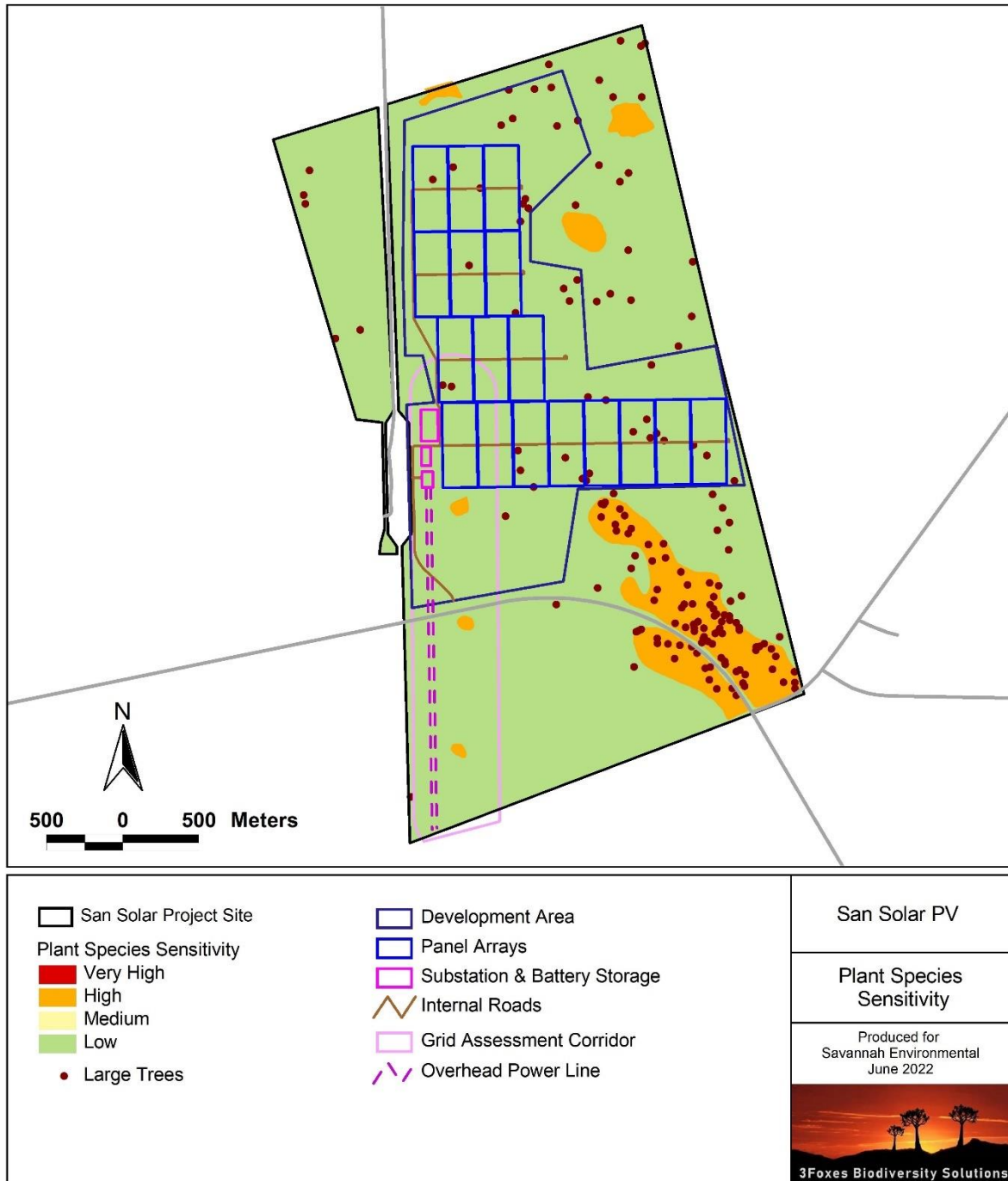


**Figure 8.** View over one of the larger pans at the site. These areas have been mapped as sensitive features of the site and have been excluded from the development footprint.

### **3.3 LISTED AND PROTECTED PLANT SPECIES**

Two NFA-protected tree species occur at the site, *Boscia albitrunca* and *Vachelia erioloba*. Based on the results of the field assessment and the previous walk-through study that was conducted on the site, it is estimated that less than 100 *Vachelia erioloba* trees would be lost to the development, while up to 150 *Boscia albitrunca* trees would be lost. The *Boscia albitrunca* present at the site are mostly shrubby and flat versions, with few actual upright trees present. The *Vachelia erioloba* present are moderately tall with larger individuals present in the southwest of the site, outside of the development footprint. Given the size and density of *Vachelia erioloba* and *Boscia albitrunca* at the site, an offset to deal with the loss of these individuals from the site is not considered warranted as these are not significant numbers and would not impact the local populations of these species in any way.

The verified plant species theme sensitivity is illustrated below in Figure 9 and show that the PV facility is restricted to the low sensitivity parts of the site. The grid connection runs through areas that are also classified as low sensitivity. Although there are some small pans along the power line corridor, these have been avoided under the current layout and can also be avoided should there be any changes to the exact routing of the power line.



**Figure 9.** Verified plant species theme sensitivity for the San Solar site and grid connection.

### **3.4 PROPOSED IMPACT MITIGATION MEASURES**

Mitigation and avoidance measures that should be implemented at the San Solar site to limit negative impacts on vegetation and plant species of concern include the following measures:

- Pre-construction walk-through of the facility's final layout in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DENC/DEFF permit conditions.
- Search and rescue for identified species of concern before construction.
- Vegetation clearing to commence only after walk-through and search and rescue has been conducted and necessary permits obtained.
- Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc.
- Contractor's Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities within sensitive areas such as near the pans.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-
- Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.
- Regular (annual) monitoring for alien plants during operation to ensure that no erosion problems have developed as result of the disturbance created at construction.
- Woody aliens should be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present. This might include the use of herbicides where no practical manual means are available.

### **3.5 CONCLUSIONS – PLANT SPECIES COMPLIANCE STATEMENT**

- This compliance statement is applicable to the San Solar PV and grid connection development with specific reference to the layout as provided for the assessment.
- The vegetation of the site consists in intact Kathu Bushveld. This is however not the more typical *Vachelia erioloba* savannah community, but rather consists of encroached bush dominated by *Senegalia mellifera* subsp. *detinens*. No red-listed plant species were observed at the site and the density of protected tree species was low with only *Vachelia erioloba* and *Boscia albitrunca* being present at low density. The development would not compromise the local populations of these species in any way.
- Sensitive areas present at the site that have been avoided under the final development footprint include the pans and the area of dense *Vachelia erioloba* in the south-east of the site.

- Given the low sensitivity of the development footprint and the avoidance of the sensitive habitats present at the site, there are no reasons that the development should not go ahead from a plant ecology perspective.

## 4 Faunal Species Baseline

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### 4.1 MAMMALS

The mammalian community at the project site is assessed as being of moderate diversity. Although more than 50 species of terrestrial mammals are known from the wider area, the extent and habitat diversity of the project site is too low to support a very wide range of mammals. Species observed on-site or confirmed present on nearby sites in the area include Aardvark, Cape Porcupine, Springhare, South African Ground Squirrel, Scrub hare, Vervet Monkey, Small-spotted Genet, Yellow Mongoose, Slender Mongoose, Black-Backed Jackal, Steenbok, Duiker and Kudu. Small mammals trapped in the area include Desert Pygmy Mouse *Mus indutus*, Multimammate Mouse *Mastomys coucha*, Bushveld Gerbil *Tatera leucogaster*, Hairy footed Gerbil *Gerbillurus paeba*, Pouched Mouse *Saccostomus campestris* and Grey Climbing Mouse *Dendromus melanotis*.

Five listed terrestrial mammal species potentially occur in the area; these are the Brown Hyaena *Hyaena brunnea* (Near Threatened), Black-footed Cat *Felis nigripes* (Vulnerable), Leopard *Panthera pardus* (VU), Ground Pangolin *Smutsia temminckii* (Vulnerable) and South African Hedgehog *Atelerix frontalis* (Vulnerable). The Leopard and Brown Hyaena are not likely to occur in the area on account of the agricultural land-use in the area which is not usually conducive to the persistence of large carnivores. The Black-footed Cat is a secretive species which would be likely to occur in the wider area and possibly at the project site given that it occurs within arid, open country. The Hedgehog and Ground Pangolin may also occur in the area at typically low density. Given the extensive national ranges of these species, the impact of the proposed development on habitat loss for these species would be minimal and a long-term impact on these species would be unlikely. As a result, the site is considered to be low sensitivity for these species.

### 4.2 REPTILES

The project site lies in or near the distribution range of more than 50 reptile species, although many of these are unlikely to occur at the project site as it is restricted largely to sandy substrate and does not include rocky habitat or other habitats that are important for reptiles (Appendix 3). No species of conservation concern are known to occur in the area. The habitat diversity within the study area is relatively low with the result that the number of reptile

species present within the project site is likely to be relatively low and only a proportion of the species known from the area are likely to be present on the project site itself.

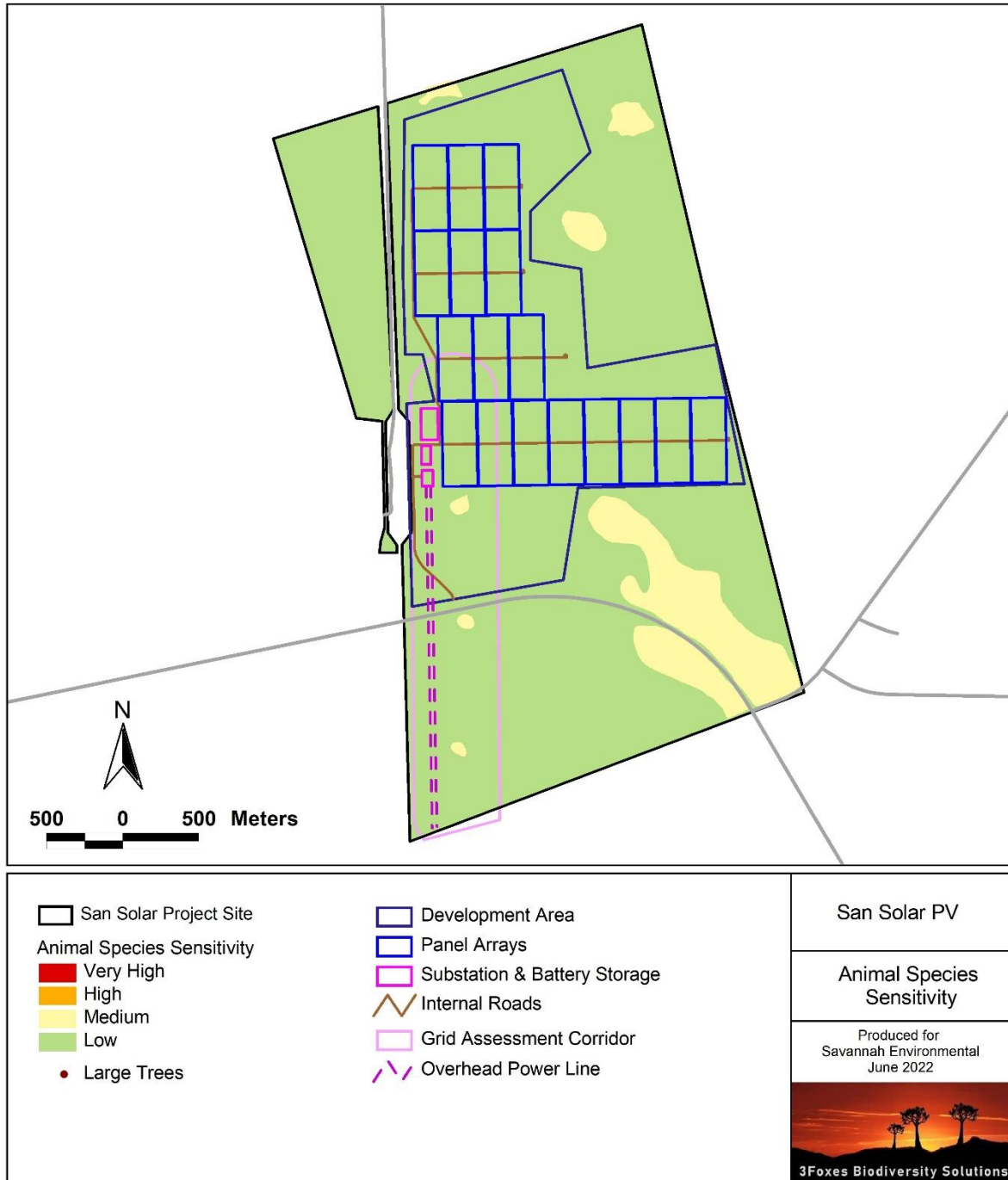
Species observed on the site of in the immediate area in the past include Serrated Tent Tortoise *Psammobates oculifer*, Cape Cobra *Naja nivea*, Ground Agama *Agama aculeata*, Spotted Sand Lizard *Pedioplanis lineoocellata*, Variable Skink *Trachylepis varia*, Bibron's Blind Snake *Afrotyphlops bibronii*, Western Rock Skink *Mabuya sulcata sulcata*, Kalahari Tree Skink *Trachylepis spilogaster*, Cape Gecko *Lygodactylus capensis capensis*, Speckled Rock Skink *Trachylepis punctatissima*, Striped Skaapsteker *Psammophylax tritaeniatus* and Boomslang *Dispholidus typus typus*. Impacts on reptiles are likely to be restricted largely to habitat loss within the development footprint. This is likely to be of local significance only as there are no very rare species or specialised habitats present within the footprint area.

#### **4.3 AMPHIBIANS**

The project site lies within or near the range of 10 amphibian species, indicating that the project site potentially has a moderately diverse frog community for an arid area. There is no natural permanent water or artificial earth dams within the project site that would represent suitable breeding habitat for most of these species. The pans which are present at the site would occasionally contain sufficient water for breeding purposes for those species which do not require permanent water. Given the paucity of permanent water at the site, only those species which are relatively independent of water are likely to occur in the area. Species previously observed in the vicinity of the site include Eastern Olive Toad *Amietophrynus garmani* and Bushveld Rain Frog *Breviceps adspersus*, both of which are likely to occur at the project site.

#### **4.4 ANIMAL SPECIES SENSITIVITY**

The animal species sensitivity for the San Solar site is illustrated below in Figure 10. The majority of the site is considered low sensitivity for fauna. The pans and the deeper sands in the south-east of the site are considered to be moderate sensitivity and contribute to the habitat diversity of the site. There are no areas at the site which are considered specifically high sensitivity for terrestrial fauna. As such, the San Solar site is considered acceptable for the development of the PV facility and grid connection from a terrestrial fauna perspective.



**Figure 10.** Verified animal species sensitivity for the San Solar site and grid connection.

#### 4.5 PROPOSED IMPACT MITIGATION MEASURES

Mitigation and avoidance measures that should be implemented at the San Solar site to limit negative impacts on faunal habitats and animal species of concern include the following measures:



- All personnel should undergo environmental induction with regards to fauna and, in particular, awareness about not harming or collecting species such as snakes, tortoises and owls, which are often persecuted out of superstition.
- Any fauna threatened by the construction activities should be removed to safety by an appropriately qualified environmental officer.
- All construction vehicles should adhere to a low speed limit (30km/h for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises.
- 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.
- If trenches need to be dug for electrical cabling or other purpose, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Trenches which are standing open should have places where there are soil ramps allowing fauna to escape the trench.
- Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
- If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
- If the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences because they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks. Alternatively, the electrified strands should be placed on the inside of the fence and not the outside as is the case on the majority of already constructed PV plants.

#### **4.6 CONCLUSIONS – ANIMAL SPECIES COMPLIANCE STATEMENT**

- This compliance statement is applicable to the San Solar PV and grid connection development with specific reference to the layout as provided for the assessment.
- The bushveld habitat at the site is considered to be low sensitivity as it is encroached by *Senegalia mellifera*, and there are not likely to be any species of concern resident on the site.
- Although there are no faunal habitats present at the site which are considered to be high sensitivity, the pans and the deeper red sands in the south-east of the site are considered to be moderate sensitivity for fauna, but have been avoided under the assessed layout.
- Given the low sensitivity of the development footprint and the avoidance of the sensitive faunal habitats present at the site, there are no reasons that the development should not go ahead from an animal ecology perspective.

## 5 Terrestrial Biodiversity Impact Assessment

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In terms of the DFFE Screening Tool, parts of the site are classified as Very High sensitivity for the Relative Terrestrial Biodiversity Theme due to the presence of ESAs within the site. There are no CBAs within the site and the nearest CBA is approximately 10km south-east from the site. As a result, it is clear that the development would not impact on CBAs. In addition, there are no NC-PAES focus areas in close proximity to the site.

### 5.1 SCOPE

In terms of the published guidelines, "*Criteria for the Assessment and Reporting of Impacts on Terrestrial Biodiversity for Activities Requiring Environmental Authorisation*" the assessment must include the following:

- The assessment must be undertaken by a SACNASP registered specialist, on the preferred development site.
- Description of the preferred site - the following aspects, as a minimum, must be considered in the baseline description:
  - A description of the ecological drivers/processes of the system and how the proposed development will impact these;
  - Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the proposed development site;
  - The ecological corridors that the development would impede including migration and movement of flora and fauna;
  - The description of any significant landscape features (including rare or important flora/faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Areas (FEPA) sub catchments;
  - A description of terrestrial biodiversity and ecosystems on the proposed development site, including –
    - Main vegetation types;
    - Threatened ecosystems, including Listed Ecosystems as well as locally important habitat types identified;
    - Ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and
    - Species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified.
- Identify any alternative development footprints within the preferred development site which would be of a "low" sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification;
- The Terrestrial Biodiversity Impact Assessment must be based on the results of a site inspection undertaken on the preferred development site and must identify:



- Terrestrial Ecological Support Areas, including;
  - The impact on the ecological processes that operate within or across the site;
  - The extent the development will impact on the functionality of the ESA; and
  - Loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna.

The findings of the Terrestrial Biodiversity Impact Assessment must be written up in a Terrestrial Biodiversity Impact Assessment Report. This report must include as a minimum the following information:

- Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise and their curriculum vitae;
- A signed statement of independence by the specialist;
- Duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- A description of the methodology used to undertake the impact assessment and site inspection, including equipment and modelling used where relevant;
- A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;
- Areas not suitable for development, to be avoided during construction and operation (where relevant);
- Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts;
- Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr; and
- A motivation where the development footprint identified as per section 2.3 in this Table were not considered stating reasons why these were not being not considered.
- A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, and any conditions to which the statement is subjected.

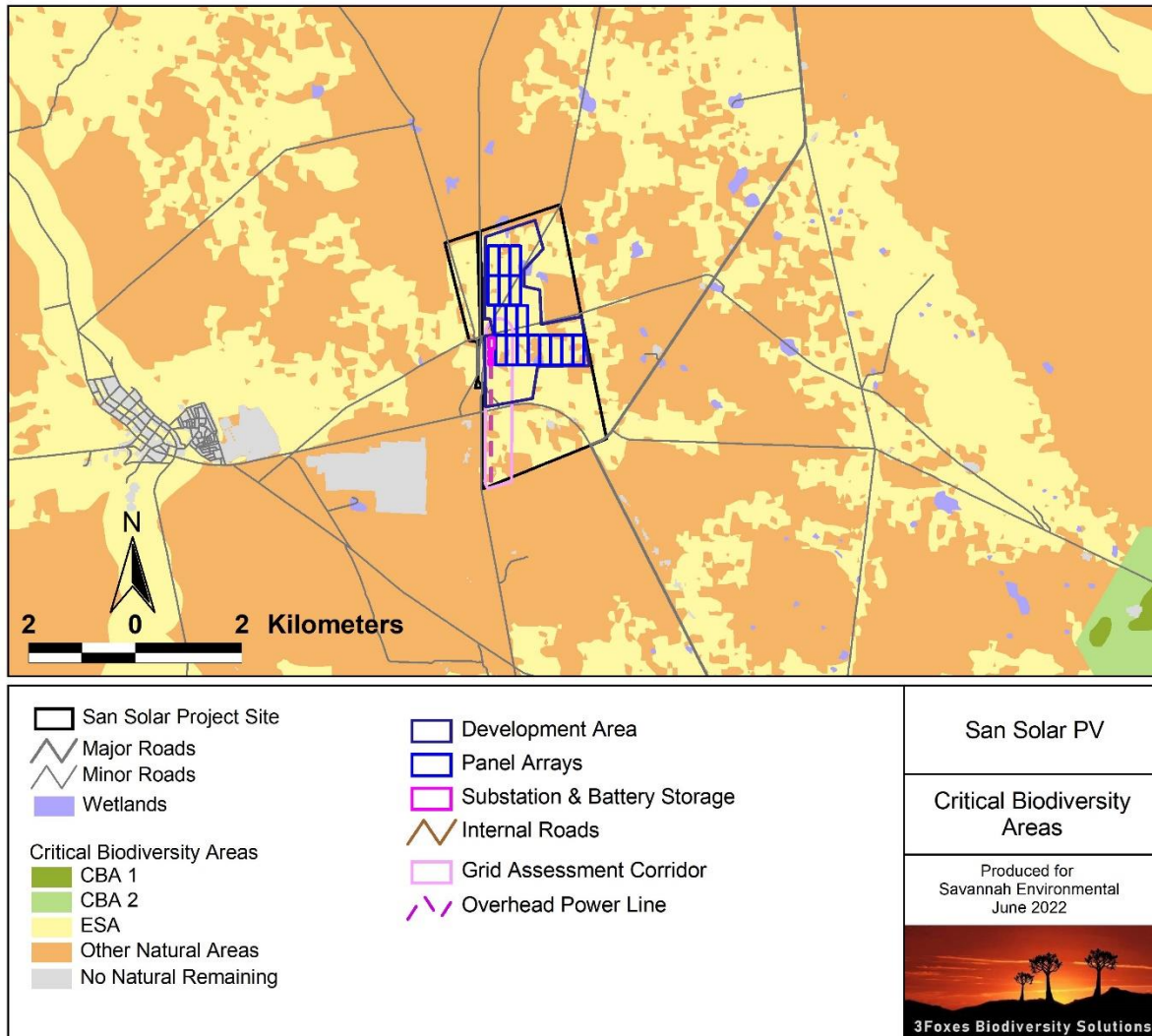
The findings of the Terrestrial Biodiversity Impact Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr. A signed copy of the Assessment must be appended to the Basic Assessment Report or Environmental Assessment Report.

## **5.2 TERRESTRIAL BIODIVERSITY BASELINE**

An extract of the Northern Cape Critical Biodiversity Areas map for the study area is depicted below in Figure 11. The project area is a mix of ESA and "Other natural areas", with no CBAs in close proximity to the site. The lack of CBAs within the site is clearly a positive feature of the site in terms of development potential, but the predominance of ESAs is a potential concern. The reasons layer behind the Northern Cape CBA map indicates that the ESAs are based on the presence of the following features: Kathu Bushveld, Conservation Areas, Wetlands and Landscape Structural Elements. It is not clear what the Conservation Areas being referred to are as the only formal conservation area in the vicinity is the Kathu Forest Nature Reserve which is some distance south-east from the site.

The site verification indicates that there are no visible differences between the areas classified as ESA and those areas classified as "Other Natural Areas". In the Northern Cape CBA map, this distinction is based on satellite imagery of the area, but it is not clear what features the analysis is trying to distinguish. The majority of the site consists of bush-encroached Kathu Bushveld, and not more open *Vachelia erioloba* dominated savannah which typically occurs on the deeper sands of the area and is considered to represent a more sensitive habitat than the encroached areas or the areas of shallow soils in general.

In terms of broad-scale ecological processes, there are two large drainage systems in the area, the Ga-Mogara River west of the site and the Vlermuisleegte River east of the site, that would represent broad-scale ecological corridors running through the area. The development would not have an impact on either of these two systems. There would also, in principle be some movement of fauna through the site, but as there are no particular features present which would make the site more desirable than adjacent areas, the site is considered typical for the area and is not considered to be of above average significance for faunal movement or other ecological processes. The location of the proposed facility immediately adjacent to an existing PV facility and nearby another is seen as a positive aspect of the current development as concentrating development to within a node may increase local impacts but reduces habitat loss and fragmentation of habitat overall and is seen as being preferred to more dispersed development, especially when the affected habitat is considered relatively low sensitivity.



**Figure 11.** Extract of the Northern Cape Critical Biodiversity Areas map for the study area.

Based on the site verification, there is little ecological basis to support the differentiation of the areas classified as ESAs from the remainder of the site. As such, habitat loss in general is considered to represent the main impact associated with the development, rather than habitat loss within the ESAs only. However, the presence of the PV development would significantly reduce the ecological value of the affected area and would ultimately compromise the function of the affected ESAs within the development footprint. However, as the main features of significance which were identified during the site verification, that being the pans and the area of high *Vachelia erioloba* tree density in the south-east of the site have been avoided by the PV development footprint, the overall impact of the development on terrestrial biodiversity is considered to be low.

### **5.3 CURRENT BASELINE & CUMULATIVE IMPACT**

There are numerous other proposed PV facilities in the wider area surrounding the project site. There are several existing solar projects in the Kathu area including the already built Kathu PV Facility (180 ha), Sishen Solar PV Plant (320 ha) and Kathu Solar Park (CSP - 400 ha), all of which are in close proximity to the San Solar site. There are also numerous planned and authorised facilities in the area most notably the Hyperion PV series of facilities north-east of the site and the Lekogo, Mogobe and Gaetsewe PV projects located east of Kathu south of the project site. The existing built facilities occupy an area of about 900 ha and are considered to form part of the existing baseline for the area. The footprint of these is however relatively low in comparison with the footprint of the iron and manganese mines in the area, which is estimated at 12 000ha and represent the major driver of habitat loss and transformation in the Hotazel-Kuruman-Kathu area and especially within the Kathu Bushveld vegetation type. There are several authorised developments in the general vicinity of the project site, which would potentially add an area of up to 2000ha to the baseline. All these developments raise the potential for significant cumulative impact in the area, especially within the Kathu Bushveld vegetation type. The primary issue with regards to cumulative impacts in the area is considered to be the loss of habitat and the implications of this for ecological functioning and landscape connectivity in the area. As the site is considered typical for the area and is located within the shallow soil community of the Kathu Bushveld vegetation type and is dominated by species such as *Senegalia mellifera* and *Tarchonanthus camphoratus*, it is not considered to be of specific local or regional significance. In addition, the proximity of the development to the already constructed Kathu PV facility and Sishen Solar Plant is seen as reducing the specific contribution of the current project to overall cumulative impact. As such, the contribution of the current project to cumulative impact is seen as being acceptable.

### **5.4 IDENTIFICATION & NATURE OF IMPACTS**

In this section, the potential impacts and associated risk factors that may be generated by the proposed development on terrestrial biodiversity are identified and described.

### **5.5 IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES**

Potential ecological impacts resulting from the proposed development of the San Solar PV Development and associated grid connection infrastructure would stem from a variety of different activities and risk factors associated with the preconstruction, construction and operational phases of the project including the following:

*Impact on ESAs and broad-scale ecological processes*

Although there are no CBAs within the site, a large proportion of the site consists of Ecological Support Areas. Transformation of intact habitat within the ESAs on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the presence of a number of other renewable energy and mining developments in the area, this is a potential cumulative impact of the development that is assessed.

*Cumulative Impacts on Terrestrial Ecology*

The development of the San Solar PV project would result in habitat loss and an increase in overall cumulative impacts on fauna and flora in the area. This would be in addition to existing baseline of impact in the area which is already considered to be fairly high. The sensitivity of the affected habitat is however considered to be relatively low and the specific contribution of the San Solar project is relatively low.

**5.6 ASSESSMENT OF IMPACTS**

The various identified potential impacts are assessed below for the different phases of the proposed development.

**5.6.1 San Solar PV Development & Grid Connection**

The following is an assessment of the San Solar PV Development and associated infrastructure including access roads, for the planning and construction and operational phase of the proposed development.

**Planning & Construction Phase**

**Impact 1. Impacts On ESAs and Broad-Scale Ecological Processes**

<b>Impact Nature:</b> Transformation and presence of the facility will contribute to cumulative habitat loss within ESAs and impacts on broad-scale ecological processes such as fragmentation.		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long-term (4)	Long-term (4)
<b>Magnitude</b>	Low (3)	Minor (2)
<b>Probability</b>	Certain (5)	Highly Probable (4)
<b>Significance</b>	Medium (40)	Low (28)
<b>Status</b>	Negative	Negative

<b>Reversibility</b>	Moderate	Moderate
<b>Irreplaceable loss of resources</b>	No	No
<b>Can impacts be mitigated?</b>	To some degree, but the habitat loss associated with the project is largely unavoidable.	
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• Minimise the development footprint within the high sensitivity areas.</li> <li>• There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora.</li> <li>• All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development.</li> <li>• Disturbance on the site should be kept to a minimum during operation and maintenance activities.</li> </ul>	
<b>Residual Risks</b>	Habitat loss within the ESAs cannot be fully mitigated or avoided with the result that some residual habitat and local disturbance, for affected fauna and flora will occur during operation of the facility.	

**5.6.2 Cumulative Impacts**

The following are the cumulative impacts that are assessed as being a likely consequence of the development of the San Solar PV Facility and associated Grid Connection. This is assessed in context of the extent of the current site, other developments in the area as well as general habitat loss and transformation resulting from mining, agriculture and other activities in the area.

**Cumulative Impact 1. Cumulative Impact on terrestrial ecology.**

<b>Impact Nature:</b> Development of the San Solar PV plant may impact on broad-scale ecological processes such as the ability of fauna to disperse. The development would potentially contribute to habitat degradation and the loss of landscape connectivity and ecosystem function within the area, but this is likely to be relatively low as most species are likely to be able to avoid the facility as there are still relatively large intact corridors present in the area.		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long-term (4)	Long-term (4)
<b>Magnitude</b>	Low (3)	Low (4)
<b>Probability</b>	Improbable (2)	Probable (3)
<b>Significance</b>	Low (16)	Low (27)
<b>Status</b>	Negative	Negative

<b>Reversibility</b>	Moderate	Moderate
<b>Irreplaceable loss of resources</b>	Low	Low
<b>Can impacts be mitigated?</b>	Only partly as a significant proportion of the impact results from the presence and operation of the facility which cannot be well mitigated.	
<b>Mitigation</b>	<ul style="list-style-type: none"> <li>• Avoid impact on the sensitive features of the site such as the larger pans and the deeper sands in the south of the site.</li> <li>• Ensure that the mitigation hierarchy is applied with a particular emphasis on reducing the development footprint, rehabilitating disturbed areas and minimising degradation around the site.</li> <li>• An open space management plan should be developed for the site, which should include management of biodiversity within the affected areas, as well as that in the adjacent bushveld.</li> </ul>	
<b>Residual Risks</b>	The presence of the various facilities will represent an obstacle for some fauna which would contribute to fragmentation in the area.	

## 6 Conclusion - Combined Terrestrial Biodiversity

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The vegetation of the San Solar PV site consists of Kathu Bushveld which is a relatively restricted vegetation type, but which is currently not threatened as it is still largely intact despite an increasing development footprint due to mining and solar PV development in the Kathu area. The majority of the San Solar site consists of shrubland on shallow soils with a relatively low abundance of plant species of concern. There are however some pans within the site as well as an area of deeper sands in the south-east of the site which are considered higher sensitivity than the rest of the site but which have been avoided by the development footprint.

Although there are no CBAs within the site, there are extensive areas of ESA within the site that cannot be avoided and which would be lost to the development. The site verification indicates that there are no visible differences between the areas classified as ESA and those areas classified as "Other Natural Areas". The majority of the site consists of bush-encroached Kathu Bushveld, and not more open *Vachelia erioloba*-dominated savannah which typically occurs on the deeper sands of the area and is considered to represent a more sensitive habitat than the encroached areas or the areas of shallow soils in general. As the site does not appear to be within an area of high significance in terms of ecological processes and connectivity, the loss of the ESA to development is considered acceptable and has been assessed as being of low significance after mitigation.

### *Impact Statement*

There are no impacts on terrestrial biodiversity associated with the development of the San Solar PV development and Grid Connection that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation be implemented, this development is deemed

acceptable from a terrestrial ecological impact perspective. In terms of cumulative impacts, the contribution of the current project is considered acceptable, largely as a result of the context of the site and the low sensitivity of the affected area. It is thus the reasoned opinion of the specialist that there the San Solar PV development and Grid Connection development should be authorised subject to the various mitigation and avoidance measures as indicated.

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## 7 REFERENCES

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- Alexander, G. & Marais, J. 2007. *A Guide to the Reptiles of Southern Africa*. Struik Nature, Cape Town.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & de Villiers, M. S. 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Strelitzia 32. SANBI, Pretoria.
- Branch W.R. 1998. *Field guide to snakes and other reptiles of southern Africa*. Struik, Cape Town.
- Du Preez, L. & Carruthers, V. 2009. *A Complete Guide to the Frogs of Southern Africa*. Struik Nature., Cape Town.
- EWT & SANBI, 2016. Red List of Mammals of South Africa, Lesotho and Swaziland. EWT, Johannesburg.
- Marais, J. 2004. *Complete Guide to the Snakes of Southern Africa*. Struik Nature, Cape Town.
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Mucina L. & Rutherford M.C. (eds) 2006. *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Oosthuysen, E. & Holness, S. 2016. Northern Cape Critical Biodiversity Areas (CBA) Map. Northern Cape Department of Environment and Nature Conservation & Nelson Mandela Metropolitan University. Available at SANBI BGIS <http://bgis.sanbi.org/>.
- Skinner, J.D. & Chimimba, C.T. 2005. The mammals of the Southern African Subregion. Cambridge University Press, Cambridge.

**8 ANNEX 1. LIST OF PLANT SPECIES**

List of plant species confirmed present in the vicinity of the San Solar site.

Family	Species	IUCN Status
ACANTHACEAE	<i>Barleria rigida</i>	LC
ACANTHACEAE	<i>Justicia puberula</i>	LC
AIZOACEAE	<i>Plinthus sericeus</i>	LC
AMARANTHACEAE	<i>Gomphrena celosioides</i>	LC
AMARANTHACEAE	<i>Hermbstaedtia odorata var. odorata</i>	LC
AMARANTHACEAE	<i>Pupalia lappacea var. lappacea</i>	LC
AMARYLLIDACEAE	<i>Boophone disticha</i>	LC
ANACARDIACEAE	<i>Searsia ciliata</i>	LC
APOCYNACEAE	<i>Raphionacme velutina</i>	LC
ASPARAGACEAE	<i>Asparagus laricinus</i>	LC
ASPARAGACEAE	<i>Asparagus retrofractus</i>	LC
ASPHODELIACEAE	<i>Bulbine narcissifolia</i>	LC
ASTERACEAE	<i>Chrysocoma ciliata</i>	LC
ASTERACEAE	<i>Dicoma schinzii</i>	LC
ASTERACEAE	<i>Felicia muricata subsp. cinerascens</i>	LC
ASTERACEAE	<i>Gazania krebsiana subsp. krebsiana</i>	LC
ASTERACEAE	<i>Geigeria ornativa</i>	LC
ASTERACEAE	<i>Helichrysum zeyheri</i>	LC
ASTERACEAE	<i>Hertia pallens</i>	LC
ASTERACEAE	<i>Nolletia ciliaris</i>	LC
ASTERACEAE	<i>Osteospermum muricatum</i>	LC
ASTERACEAE	<i>Pegolettia retrofracta</i>	LC
ASTERACEAE	<i>Pentzia calcarea</i>	LC
ASTERACEAE	<i>Pentzia sphaerocephala</i>	LC
ASTERACEAE	<i>Pteronia incana</i>	LC
ASTERACEAE	<i>Rosenia humilis</i>	LC
ASTERACEAE	<i>Senecio inaequidens</i>	LC
ASTERACEAE	<i>Tarchonanthus camphoratus</i>	LC
ASTERACEAE	<i>Verbesina encelioides</i>	LC
BORAGINACEAE	<i>Ehretia rigida subsp. rigida</i>	LC
BORAGINACEAE	<i>Heliotropium ciliatum</i>	LC
CAPPARACEAE	<i>Cleome rubella</i>	LC
CELASTRACEAE	<i>Gymnosporia buxifolia</i>	LC
COMMELINACEAE	<i>Commelina africana var. africana</i>	LC
CUCURBITACEAE	<i>Acanthosicyos naudinianus</i>	LC
CUCURBITACEAE	<i>Coccinia sessilifolia</i>	LC
CUCURBITACEAE	<i>Cucumis africanus</i>	LC
CYPERACEAE	<i>Cyperus margaritaceus var. margaritaceus</i>	LC

CYPERACEAE	<i>Kyllinga alba</i>	LC
EBENACEAE	<i>Diospyros lycioides subsp. lycioides</i>	LC
ERIOSPERMACEAE	<i>Eriospermum sp.</i>	LC
EUPHORBIACEAE	<i>Tragia dioica</i>	LC
FABACEAE	<i>Vachellia hebeclada</i>	LC
FABACEAE	<i>Vachellia erioloba</i>	LC
FABACEAE	<i>Vachellia haematoxylon</i>	LC
FABACEAE	<i>Vachellia karroo</i>	LC
FABACEAE	<i>Vachellia mellifera subsp. detinens</i>	LC
FABACEAE	<i>Cyamopsis serrata</i>	LC
FABACEAE	<i>Elephantorrhiza elephantina</i>	LC
FABACEAE	<i>Indigofera daleoides var. daleoides</i>	LC
FABACEAE	<i>Lessertia pauciflora var. pauciflora</i>	LC
FABACEAE	<i>Melolobium exudans</i>	LC
FABACEAE	<i>Melolobium macrocalyx var. macrocalyx</i>	LC
FABACEAE	<i>Senna italica subsp. arachoides</i>	LC
FABACEAE	<i>Tephrosia burchellii</i>	LC
FABACEAE	<i>Tephrosia longipes subsp. longipes var. longipes</i>	LC
GERANIACEAE	<i>Monsonia angustifolia</i>	LC
GISEKIACEAE	<i>Gisekia pharnacioides var. pharnacioides</i>	LC
HYACINTHACEAE	<i>Dipcadi viride</i>	LC
HYACINTHACEAE	<i>Ledebouria ovatifolia</i>	LC
IRIDACEAE	<i>Babiana bainesii</i>	LC
LAMIACEAE	<i>Acrotome inflata</i>	LC
LAMIACEAE	<i>Leucas capensis</i>	LC
MALVACEAE	<i>Corchorus pinnatipartitus</i>	LC
MALVACEAE	<i>Grewia flava</i>	LC
MALVACEAE	<i>Hermannia comosa</i>	LC
MALVACEAE	<i>Hermannia jacobefolia</i>	LC
MALVACEAE	<i>Hermannia linnaeoides</i>	LC
MALVACEAE	<i>Hermannia tomentosa</i>	LC
MALVACEAE	<i>Hibiscus marlothianus</i>	LC
MALVACEAE	<i>Hibiscus pusillus</i>	LC
MALVACEAE	<i>Pavonia burchellii</i>	LC
MOLLUGINACEAE	<i>Hypertelis salsoloides</i>	LC
MOLLUGINACEAE	<i>Limeum aethiopicum var. intermedium</i>	LC
MOLLUGINACEAE	<i>Limeum argute carinatum var. argute carinatum</i>	LC
MOLLUGINACEAE	<i>Limeum fenestratum var. fenestratum</i>	LC
MOLLUGINACEAE	<i>Limeum sulcatum var. sulcatum</i>	LC
MOLLUGINACEAE	<i>Mollugo cerviana</i>	LC
OROBANCHACEAE	<i>Striga bilabiata subsp. bilabiata</i>	LC
OXALIDACEAE	<i>Oxalis depressa</i>	LC
OXALIDACEAE	<i>Oxalis lawsonii</i>	LC
PEDALIACEAE	<i>Sesamum triphyllum</i>	LC

PHYLLANTHACEAE	<i>Phyllanthus maderaspatensis</i>	LC
POACEAE	<i>Aristida adscensionis</i>	LC
POACEAE	<i>Aristida congesta subsp. congesta</i>	LC
POACEAE	<i>Aristida meridionalis</i>	LC
POACEAE	<i>Aristida stipitata subsp. graciliflora</i>	LC
POACEAE	<i>Aristida stipitata subsp. stipitata</i>	LC
POACEAE	<i>Brachiaria marlothii</i>	LC
POACEAE	<i>Cenchrus ciliaris</i>	LC
POACEAE	<i>Cymbopogon popischilli</i>	LC
POACEAE	<i>Cynodon dactylon</i>	LC
POACEAE	<i>Enneapogon cenchroides</i>	LC
POACEAE	<i>Enneapogon desvauxii</i>	LC
POACEAE	<i>Eragrostis biflora</i>	LC
POACEAE	<i>Eragrostis lehmanniana var. chaunantha</i>	LC
POACEAE	<i>Eragrostis nindensis</i>	LC
POACEAE	<i>Eragrostis obtusa</i>	LC
POACEAE	<i>Fingerhuthia africana</i>	LC
POACEAE	<i>Melinis repens subsp. repens</i>	LC
POACEAE	<i>Oropetium capense</i>	LC
POACEAE	<i>Pogonarthria squarrosa</i>	LC
POACEAE	<i>Schmidtia pappophoroides</i>	LC
POACEAE	<i>Stipagrostis obtusa</i>	LC
POACEAE	<i>Stipagrostis uniplumis var. uniplumis</i>	LC
POACEAE	<i>Tragus berteronianus</i>	LC
POLYGALACEAE	<i>Polygala seminuda</i>	LC
PORTULACACEAE	<i>Portulaca kermesina</i>	LC
PORTULACACEAE	<i>Talinum arnotii</i>	LC
RANUNCULACEAE	<i>Clematis brachiata</i>	LC
RHAMNACEAE	<i>Ziziphus mucronata subsp. mucronata</i>	LC
RUBIACEAE	<i>Kohautia caespitosa subsp. brachyloba</i>	LC
SCROPHULARIACEAE	<i>Aptosimum albomarginatum</i>	LC
SCROPHULARIACEAE	<i>Aptosimum elongatum</i>	LC
SCROPHULARIACEAE	<i>Aptosimum lineare var. lineare</i>	LC
SCROPHULARIACEAE	<i>Chaenostoma halimifolium</i>	LC
SCROPHULARIACEAE	<i>Jamesbrittenia atropurpurea subsp. atropurpurea</i>	LC
SCROPHULARIACEAE	<i>Peliostomum leuchorhizum</i>	LC
SCROPHULARIACEAE	<i>Selago mixta</i>	LC
SCROPHULARIACEAE	<i>Sutera griquensis</i>	LC
SOLANACEAE	<i>Datura stramonium</i>	LC
SOLANACEAE	<i>Lycium hirsutum</i>	LC
THYMELAEACEAE	<i>Gnidia polycephala</i>	LC
VAHLIACEAE	<i>Vahlia capensis subsp. vulgaris var. vulgaris</i>	LC
VERBENACEAE	<i>Chascanum pinnatifidum var. pinnatifidum</i>	LC
VERBENACEAE	<i>Lantana rugosa</i>	LC

ZYGOPHYLLACEAE

*Tribulus terrestris*

LC

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**9 ANNEX 2. LIST OF MAMMALS**

List of mammals which have been observed or which are likely to occur in the vicinity of the San Solar site. Conservation status is from 2016 EWT/SANBI Red List.

Family	Scientific name	Common name	Red list category	Number of records
<i>Bathyergidae</i>	<i>Bathyergus janetta</i>	Namaqua Dune Mole-rat	Least Concern (2016)	1
<i>Bathyergidae</i>	<i>Cryptomys hottentotus</i>	Southern African Mole-rat	Least Concern (2016)	6
<i>Bathyergidae</i>	<i>Fukomys damarensis</i>	Damara Mole-rat	Least Concern (2016)	12
<i>Bovidae</i>	<i>Antidorcas marsupialis</i>	Springbok	Least Concern (2016)	7
<i>Bovidae</i>	<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern (2016)	6
<i>Bovidae</i>	<i>Oryx gazella</i>	Gemsbok	Least Concern (2016)	16
<i>Bovidae</i>	<i>Raphicerus campestris</i>	Steenbok	Least Concern (2016)	9
<i>Bovidae</i>	<i>Sylvicapra grimmia</i>	Bush Duiker	Least Concern (2016)	8
<i>Bovidae</i>	<i>Tragelaphus strepsiceros</i>	Greater Kudu	Least Concern (2016)	12
<i>Canidae</i>	<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern (2016)	10
<i>Canidae</i>	<i>Otocyon megalotis</i>	Bat-eared Fox	Least Concern (2016)	5
<i>Canidae</i>	<i>Vulpes chama</i>	Cape Fox	Least Concern (2016)	7
<i>Cercopithecidae</i>	<i>Papio ursinus</i>	Chacma Baboon	Least Concern (2016)	8
<i>Erinaceidae</i>	<i>Atelerix frontalis</i>	Southern African Hedgehog	Near Threatened (2016)	9
<i>Felidae</i>	<i>Caracal caracal</i>	Caracal	Least Concern (2016)	1
<i>Felidae</i>	<i>Felis nigripes</i>	Black-footed Cat	Vulnerable (2016)	3
<i>Felidae</i>	<i>Felis silvestris</i>	Wildcat	Least Concern (2016)	1
<i>Felidae</i>	<i>Panthera pardus</i>	Leopard	Vulnerable (2016)	4
<i>Gliridae</i>	<i>Graphiurus platyops</i>	Flat-headed African Dormouse	Data deficient	1
<i>Herpestidae</i>	<i>Cynictis penicillata</i>	Yellow Mongoose	Least Concern (2016)	2
<i>Herpestidae</i>	<i>Herpestes sanguineus</i>	Slender Mongoose	Least Concern (2016)	2
<i>Herpestidae</i>	<i>Suricata suricatta</i>	Meerkat	Least Concern (2016)	3
<i>Hyaenidae</i>	<i>Hyaena brunnea</i>	Brown Hyena	Near Threatened	12
<i>Hyaenidae</i>	<i>Proteles cristata</i>	Aardwolf	Least Concern (2016)	6
<i>Hystricidae</i>	<i>Hystrix africaeaustralis</i>	Cape Porcupine	Least Concern	16
<i>Leporidae</i>	<i>Lepus capensis</i>	Cape Hare	Least Concern	18
<i>Leporidae</i>	<i>Lepus saxatilis</i>	Scrub Hare	Least Concern	16

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<i>Leporidae</i>	<i>Pronolagus rupestris</i>	Smith's Red Rock Hare	Least Concern (2016)	14
<i>Macroscelididae</i>	<i>Elephantulus intufi</i>	Bushveld Elephant Shrew	Least Concern (2016)	1
<i>Macroscelididae</i>	<i>Elephantulus myurus</i>	Eastern Rock Elephant Shrew	Least Concern (2016)	29
<i>Macroscelididae</i>	<i>Elephantulus rupestris</i>	Western Rock Elephant Shrew	Least Concern (2016)	37
<i>Macroscelididae</i>	<i>Macroscelides proboscideus</i>	Short-eared Elephant Shrew	Least Concern (2016)	1
<i>Manidae</i>	<i>Smutsia temminckii</i>	Ground Pangolin	Vulnerable (2016)	23
<i>Muridae</i>	<i>Aethomys chrysophilus</i>	Red Veld Aethomys	Least Concern (2016)	3
<i>Muridae</i>	<i>Aethomys namaquensis</i>	Namaqua Rock Mouse	Least Concern	171
<i>Muridae</i>	<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil	Least Concern (2016)	38
<i>Muridae</i>	<i>Gerbilliscus brantsii</i>	Highveld Gerbil	Least Concern (2016)	4
<i>Muridae</i>	<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	Least Concern (2016)	103
<i>Muridae</i>	<i>Gerbilliscus paeba</i>	Paeba Hairy-footed Gerbil	Least Concern (2016)	2
<i>Muridae</i>	<i>Gerbilliscus vallinus</i>	Brush-tailed Hairy-footed Gerbil	Least Concern (2016)	4
<i>Muridae</i>	<i>Mastomys coucha</i>	Southern African Mastomys	Least Concern (2016)	56
<i>Muridae</i>	<i>Mus (Nannomys) minutoides</i>	Southern African Pygmy Mouse	Least Concern	27
<i>Muridae</i>	<i>Otomys auratus</i>	Southern African Vlei Rat	Near Threatened (2016)	3
<i>Muridae</i>	<i>Parotomys brantsii</i>	Brants's Whistling Rat	Least Concern (2016)	1
<i>Muridae</i>	<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	Least Concern (2016)	41
<i>Mustelidae</i>	<i>Ictonyx striatus</i>	Striped Polecat	Least Concern (2016)	2
<i>Mustelidae</i>	<i>Mellivora capensis</i>	Honey Badger	Least Concern (2016)	4
<i>Nesomyidae</i>	<i>Saccostomus campestris</i>	Southern African Pouched Mouse	Least Concern (2016)	45
<i>Orycteropodidae</i>	<i>Orycteropus afer</i>	Aardvark	Least Concern (2016)	4
<i>Pedetidae</i>	<i>Pedetes capensis</i>	South African Spring Hare	Least Concern (2016)	23
<i>Procaviidae</i>	<i>Procavia capensis</i>	Cape Rock Hyrax	Least Concern (2016)	15
<i>Sciuridae</i>	<i>Xerus inauris</i>	South African Ground Squirrel	Least Concern	16
<i>Soricidae</i>	<i>Crocidura cyanea</i>	Reddish-gray Musk Shrew	Least Concern (2016)	3
<i>Soricidae</i>	<i>Crocidura hirta</i>	Lesser Red Musk Shrew	Least Concern (2016)	12
<i>Suidae</i>	<i>Phacochoerus africanus</i>	Common Warthog	Least Concern (2016)	11

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**10 ANNEX 2. LIST OF REPTILES**

List of reptiles which are likely to occur at the proposed San Solar site, based on the ReptileMap database. Conservation status is from Bates et al. (2014).

Family	Scientific name	Common name	Red list category	Number of records
Agamidae	<i>Agama aculeata aculeata</i>	Common Ground Agama	Least Concern	41
Agamidae	<i>Agama atra</i>	Southern Rock Agama	Least Concern	17
Amphisbaenidae	<i>Monopeltis mauricei</i>	Maurice's Worm Lizard	Least Concern	1
Amphisbaenidae	<i>Zygaspis quadrifrons</i>	Kalahari Dwarf Worm Lizard	Least Concern	4
Chamaeleonidae	<i>Chamaeleo dilepis dilepis</i>	Common Flap-neck Chameleon	Least Concern	8
Colubridae	<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Least Concern	2
Colubridae	<i>Dispholidus typus typus</i>	Boomslang	Least Concern	3
Colubridae	<i>Philothamnus semivariatus</i>	Spotted Bush Snake	Least Concern	1
Colubridae	<i>Telescopus semiannulatus semiannulatus</i>	Eastern Tiger Snake	Least Concern	9
Cordylidae	<i>Karusasaurus polyzonus</i>	Karoo Girdled Lizard	Least Concern	7
Elapidae	<i>Aspidelaps scutatus scutatus</i>	Speckled Shield Cobra	Least Concern	4
Elapidae	<i>Dendroaspis polylepis</i>	Black Mamba	Least Concern	1
Elapidae	<i>Naja nigricincta woodi</i>	Black Spitting Cobra	Least Concern	2
Elapidae	<i>Naja nivea</i>	Cape Cobra	Least Concern	4
Gekkonidae	<i>Chondrodactylus angulifer</i>	Giant Ground Gecko	Least Concern	4
Gekkonidae	<i>Chondrodactylus angulifer angulifer</i>	Common Giant Ground Gecko	Least Concern	9
Gekkonidae	<i>Chondrodactylus bibronii</i>	Bibron's Gecko	Least Concern	3
Gekkonidae	<i>Lygodactylus bradfieldi</i>	Bradfield's Dwarf Gecko	Least Concern	1
Gekkonidae	<i>Lygodactylus capensis capensis</i>	Common Dwarf Gecko	Least Concern	8
Gekkonidae	<i>Pachydactylus capensis</i>	Cape Gecko	Least Concern	14
Gekkonidae	<i>Pachydactylus rugosus</i>	Common Rough Gecko	Least Concern	1
Gekkonidae	<i>Pachydactylus wahlbergii wahlbergii</i>	Kalahari Ground Gecko	Least Concern	12
Gekkonidae	<i>Ptenopus garrulus garrulus</i>	Common Barking Gecko	Least Concern	12
Gerrhosauridae	<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	Least Concern	1
Lacertidae	<i>Heliobolus lugubris</i>	Bushveld Lizard	Least Concern	23
Lacertidae	<i>Meroles squamulosus</i>	Common Rough-scaled Lizard	Least Concern	3
Lacertidae	<i>Nucras intertexta</i>	Spotted Sandveld Lizard	Least Concern	14



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<i>Lacertidae</i>	<i>Pedioplanis lineoocellata lineoocellata</i>	Spotted Sand Lizard	Least Concern	37
<i>Lacertidae</i>	<i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard	Least Concern	4
<i>Lamprophiidae</i>	<i>Aparallactus capensis</i>	Black-headed Centipede-eater	Least Concern	1
<i>Lamprophiidae</i>	<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake	Least Concern	4
<i>Lamprophiidae</i>	<i>Atractaspis duerdeni</i>	Duerden's Stiletto Snake	Least Concern	1
<i>Lamprophiidae</i>	<i>Boaedon capensis</i>	Brown House Snake	Least Concern	9
<i>Lamprophiidae</i>	<i>Lycophidion capense capense</i>	Cape Wolf Snake	Least Concern	4
<i>Lamprophiidae</i>	<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	Least Concern	6
<i>Lamprophiidae</i>	<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	Least Concern	9
<i>Lamprophiidae</i>	<i>Psammophis notostictus</i>	Karoo Sand Snake	Least Concern	1
<i>Lamprophiidae</i>	<i>Psammophis trinasalis</i>	Fork-marked Sand Snake	Least Concern	10
<i>Lamprophiidae</i>	<i>Pseudaspis cana</i>	Mole Snake	Least Concern	7
<i>Lamprophiidae</i>	<i>Xenocalamus bicolor bicolor</i>	Bicoloured Quill-snouted Snake	Least Concern	1
<i>Leptotyphlopidae</i>	<i>Leptotyphlops scutifrons scutifrons</i>	Peters' Thread Snake		6
<i>Pelomedusidae</i>	<i>Pelomedusa subrufa</i>	Central Marsh Terrapin	Least Concern	4
<i>Pythonidae</i>	<i>Python natalensis</i>	Southern African Python	Least Concern	1
<i>Scincidae</i>	<i>Acontias kgalagadi kgalagadi</i>	Striped Blind Legless Skink	Least Concern	6
<i>Scincidae</i>	<i>Panaspis wahlbergi</i>	Wahlberg's Snake-eyed Skink	Least Concern	1
<i>Scincidae</i>	<i>Trachylepis occidentalis</i>	Western Three-striped Skink	Least Concern	12
<i>Scincidae</i>	<i>Trachylepis punctatissima</i>	Speckled Rock Skink	Least Concern	12
<i>Scincidae</i>	<i>Trachylepis punctulata</i>	Speckled Sand Skink	Least Concern	1
<i>Scincidae</i>	<i>Trachylepis spilogaster</i>	Kalahari Tree Skink	Least Concern	38
<i>Scincidae</i>	<i>Trachylepis sulcata sulcata</i>	Western Rock Skink	Least Concern	15
<i>Scincidae</i>	<i>Trachylepis variegata</i>	Variiegated Skink	Least Concern	49
<i>Testudinidae</i>	<i>Psammobates oculifer</i>	Serrated Tent Tortoise	Least Concern	10
<i>Testudinidae</i>	<i>Stigmochelys pardalis</i>	Leopard Tortoise	Least Concern	3
<i>Typhlopidae</i>	<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	Least Concern	1
<i>Varanidae</i>	<i>Varanus albigularis albigularis</i>	Rock Monitor	Least Concern	13
<i>Viperidae</i>	<i>Bitis arietans arietans</i>	Puff Adder	Least Concern	10

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**11 ANNEX 3. LIST OF AMPHIBIANS**

List of amphibians which are likely to occur in the vicinity of the San Solar Site, according to the Southern African Atlas of Frogs. Conservation is from Minter et al. (2004).

<b>Family</b>	<b>Genus</b>	<b>Species</b>	<b>Common name</b>	<b>Red list category</b>
<i>Brevicipitidae</i>	<i>Breviceps</i>	<i>adpersus</i>	Bushveld Rain Frog	Least Concern
<i>Bufo</i>	<i>Amietophrynus</i>	<i>gutturalis</i>	Guttural Toad	Least Concern
<i>Bufo</i>	<i>Amietophrynus</i>	<i>poweri</i>	Power's Toad	Least Concern
<i>Bufo</i>	<i>Amietophrynus</i>	<i>rangeri</i>	Raucous Toad	Least Concern
<i>Bufo</i>	<i>Poyntonophrynus</i>	<i>vertebralis</i>	Southern Pygmy Toad	Least Concern
<i>Bufo</i>	<i>Vandijkophrynus</i>	<i>gariensis</i>	Karoo Toad	Least Concern
<i>Pipidae</i>	<i>Xenopus</i>	<i>laevis</i>	Common Platanna	Least Concern
<i>Pyxicephalidae</i>	<i>Amietia</i>	<i>angolensis</i>	Common or Angola River Frog	Least Concern
<i>Pyxicephalidae</i>	<i>Cacosternum</i>	<i>boettgeri</i>	Common Caco	Least Concern
<i>Pyxicephalidae</i>	<i>Pyxicephalus</i>	<i>adpersus</i>	Giant Bull Frog	Least Concern
<i>Pyxicephalidae</i>	<i>Tomopterna</i>	<i>cryptotis</i>	Tremelo Sand Frog	Least Concern