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

FAUNA & FLORA SPECIALIST SCOPING PHASE REPORT

savannah environmental

PRODUCED FOR SAVANNAH ENVIRONMENTAL

BY

3Foxes Biodiversity Solutions

Simon.Todd@3foxes.co.za

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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 Scoping Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity Scoping Study of the project site as part of the EIA process.

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 can be used to inform the layout of the development. 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 of the site which are considered high sensitivity and which should be avoided. In terms of fauna, there are few species of conservation concern that are likely to be present or abundant at the site and the primary impact of the development on fauna would be some habitat loss for the more common resident species. Based on the previous walk-through study of the site, it is expected to have a moderate to low density of the protected trees *Vachellia erioloba* and *Boscia albitrunca*. These species are however abundant in the area and the local populations would not be compromised to any degree by the loss of individuals within the PV footprint. The loss of the individuals of protected trees is therefore considered acceptable without the application of an offset or similar mitigation measure.

The development footprint of the San Solar PV Development facility can be restricted to low and moderate sensitivity habitat common in the Kathu-Hotazel-Kuruman area. The majority of the site is considered suitable for development and while there are habitats that should be avoided, these occupy a small proportion of the site. Although cumulative impacts in the wider Kathu area are currently on the increase due to the expansion of the mines and the proliferation of solar PV facilities in the area, these still occupy a small proportion of the Kathu Bushveld vegetation type and the contribution of the current development to cumulative impact would be low and is considered acceptable. Overall, there are no potential impacts associated with the proposed development that are considered to be of high significance and which cannot be mitigated to an acceptable level. As such, there are no fatal flaws or other major impediments that should prevent the development from proceeding into the EIA Phase.

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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

Simon Todd Pr.Sci.Nat
Director & Principle Scientist
C: 082 3326502
O: 021 782 0377
Simon.Todd@3foxes.co.za

60 Forrest Way
Glencairn
7975

Ecological Solutions for People & the Environment

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: ____20 March 2019_____

1 INTRODUCTION

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 Scoping 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 Scoping 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 can be used to inform the layout of the development. A preliminary 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 proceed to the EIA phase is made.

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, which will include the PV facility, BESS and a 132kV facility substation to be connected via a Loop-in-Loop out (LILO) connection to the Umtu 132kV overhead power

line will be identified within the study area considered in the Scoping phase. 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 east of the site).

2 METHODOLOGY

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

No site visit was conducted by the consultant for the current study. However, 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 considered sufficient to inform the current study and once a final development footprint has been decided, a full field assessment will be conducted to inform the EIA phase.

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 as well as personal knowledge of the project site. This includes delineating different habitat units identified on the satellite imagery and assigning likely sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – 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 previous field assessment as well as a desktop study. This serves to significantly reduce the limitations and assumptions required for the study. The previous assessment included a detailed field assessment and botanical study with descriptions of the different plant communities present. The walk-through study includes an estimate of the numbers of protected trees and plants present within the original development footprint. 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.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

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 1). This vegetation unit occupies an area of 7 443 km^2 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. Although no endemic species are restricted to this vegetation type, a number of Kalahari endemics are known to occur in this vegetation type such as *Vachellia luederitzii* var *luederitzii, Anthephora argentea*, *Megaloprotachne albescens*, *Panicum kalaharense* and *Neuradopsis bechuanensis*. It is more fully described as it occurs at the project site in the next section. 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.

Based on the results of the previous assessment, dominant tree species present *Vachelia erioloba*, *Senegalia mellifera*, *Boscia albitrunca*, *Diospyros lycioides*, *Grewia flava*, *Tarchonanthus camphoratus* and *Zizyphus mucronata*. Shrubs present include *Asparagus retrofractus*, *Asparagus suaveolens*, *Barleria rigida*, *Chrysocoma cilliata*, *Pentzia calcarea*, *Penzia incana* and *Melhania virescens*. Common and dominant grasses include *Aristida adscensionis*, *Aristida congesta*, *Cenchrus ciliaris*, *Enneapogon cenchroides*, *Enneapogon desvauxii*, *Eragrostis nindensis*, *Schmidtia pappophoroides* and *Stipagrostis uniplumis*.

According to the DEA Screening Tool, the site is considered low sensitivity for the plant species theme. Based on the information available for the site, this agrees with the previous assessments that found no species of conservation concern at the site, only the protected tree species which are not rare.

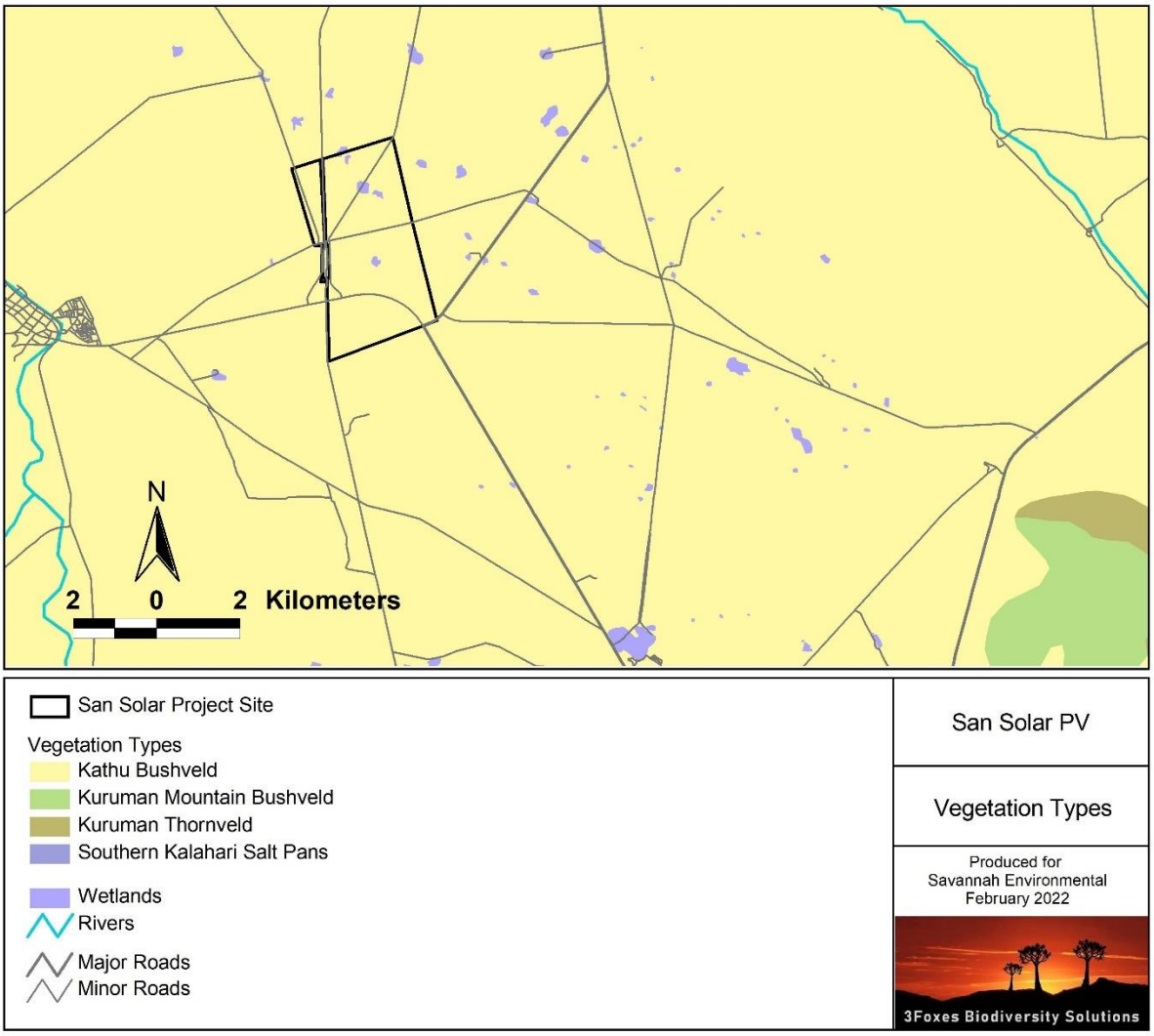

Figure 1. Broad-scale overview of the vegetation in and around the San Solar site. The site is restricted to the Kathu Bushveld vegetation type with several pans.

3.2 Listed and Protected Plant Species

Three NFA-protected tree species occur at the site, *Boscia albitrunca*, *Vachelia erioloba* and *Vachelia haematoxylon*. Based on the results of the walk-through study, which has some limitations, it is estimated that 130 *Vachelia erioloba* trees would be lost to the development, while up to 300 *Boscia albitrunca* would be lost. The transects that were conducted for the walk-through are however relatively limited in extent and it is expected that the mean density of *Vachelia erioloba* within the less favourable habitats that dominate the site is between 0.5 and 1 tree per hectare, so based on that density it is estimated that up to 300 *Vachelia erioloba* would be affected. Although no *Vachelia haematoxylon* were observed on the site during the walk-through, it is possible that this species is present at a low density. Apart

from these protected tree species, there are also several provincially protected species confirmed present such as *Babiana hypogaea* and *Nerine laticoma*.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

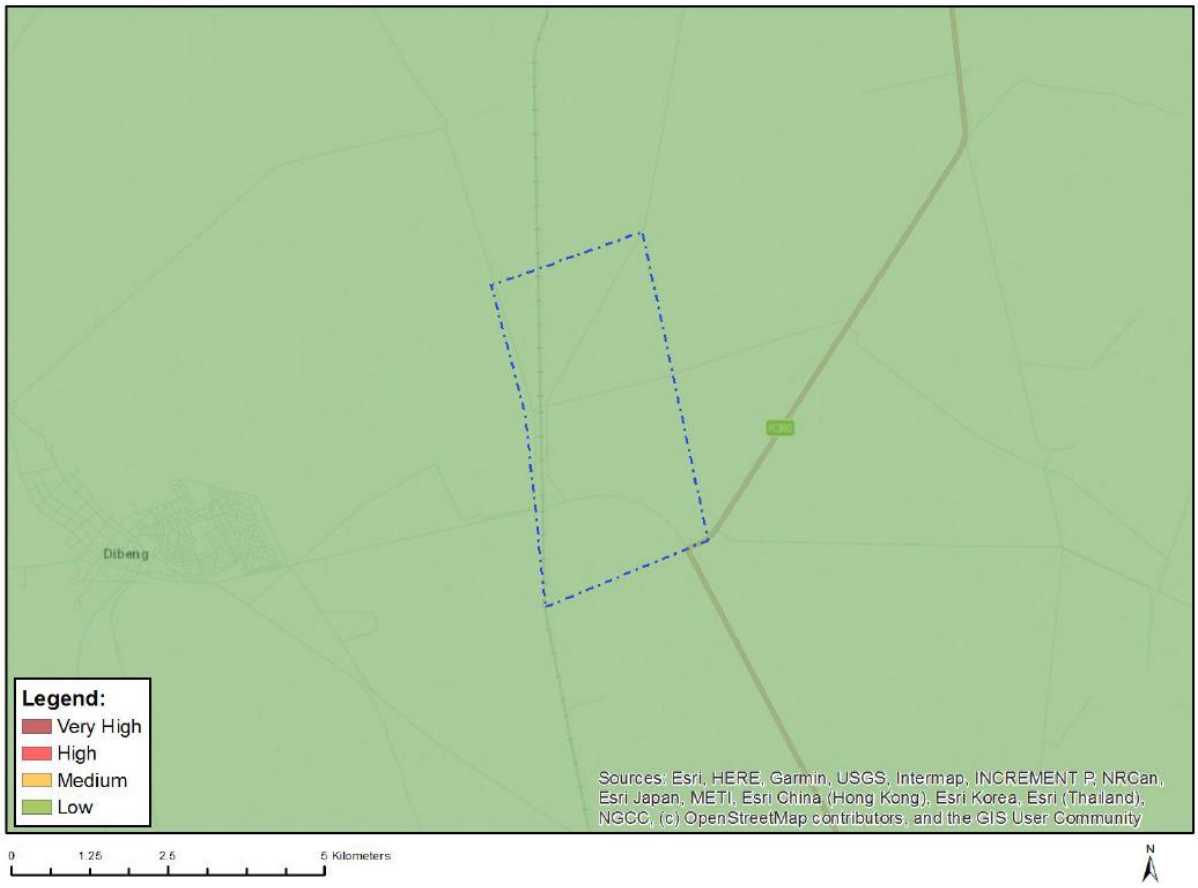

Figure 2. Plant species theme sensitivity according to the DEA Screening Tool for the San Solar site.

3.3 FAUNAL COMMUNITIES

3.3.1 Mammals

The mammalian community at the project site is likely to be 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 or otherwise confirmed present 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.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

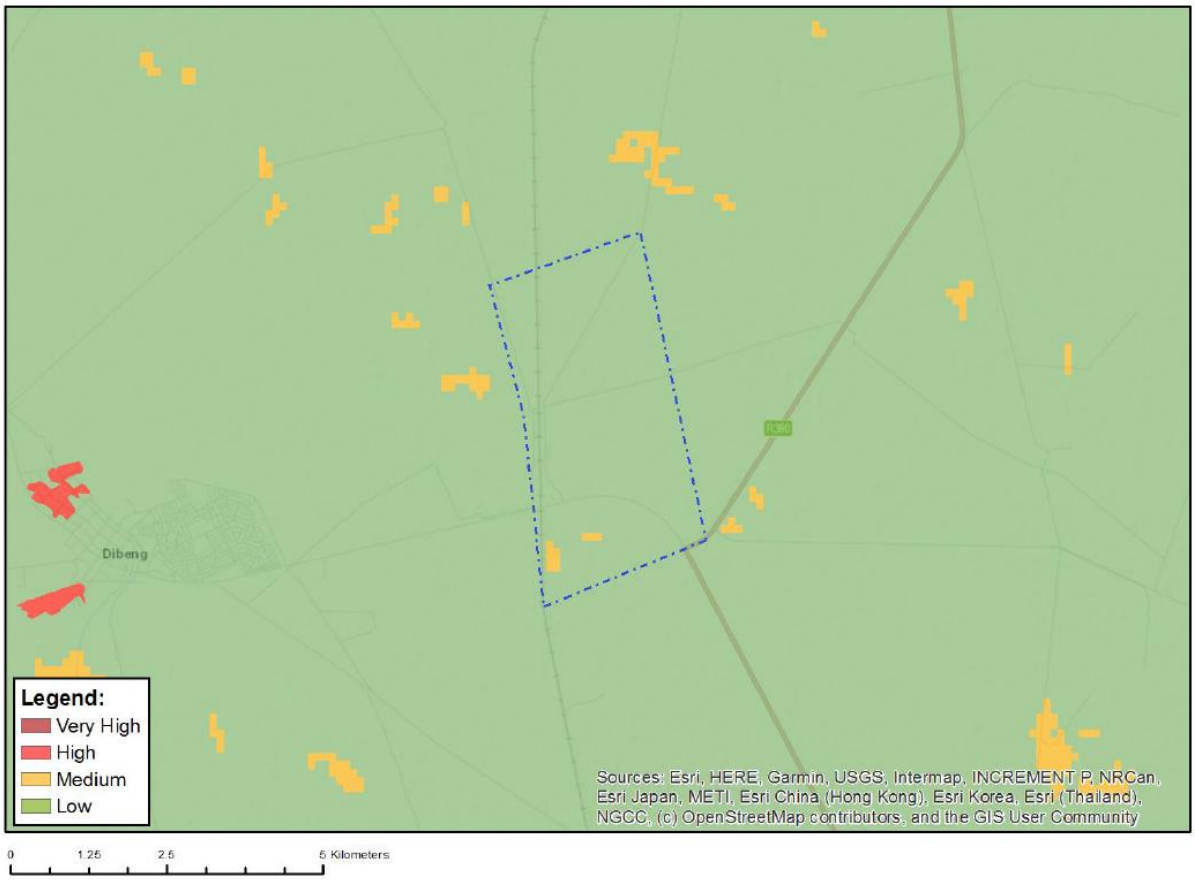

Figure 3. Animal species theme sensitivity according to the DEA Screening Tool for the San Solar site.

According to the DEA Screening Tool, the majority of the site is classified as low sensitivity for fauna with some areas of medium sensitivity related to the possible presence of the Secretarybird (Figure 3). This is not covered here but is dealt with in the avifaunal specialist study. In terms of terrestrial fauna, there are several mammals of concern that may be present at the site as mentioned above, but the site is not likely to be of significance for any of these species. This would be confirmed during the site visit for the EIA phase, but it is expected that the site sensitivity for terrestrial fauna would be medium or low sensitivity.

3.3.2 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.

3.3.3 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.

3.4 CRITICAL BIODIVERSITY AREAS & BROAD-SCALE PROCESSES

An extract of the Northern Cape Critical Biodiversity Areas map for the study area is depicted below in Figure 4. 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, 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 from the site. Also, it is not clear why parts of the site are ESA and other parts are not classified as there is no real difference between these areas in the field. This appears to be based on satellite imagery which is being used to delineate different habitats, with areas of shallow soils falling within the ESAs and deeper sandy soils falling within the other natural areas. In terms of habitat sensitivity, this is difficult to understand as the deeper sands are generally considered to be more sensitive than the shallow soils due to the high density of the protected tree species *Vachelia erioloba* and *Vachelia haematoxylon* that usually characterise these deeper soils. The only protected tree species that tends to be more common on the shallow soils than the deeper sandy soils is *Boscia albitrunca*. 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.

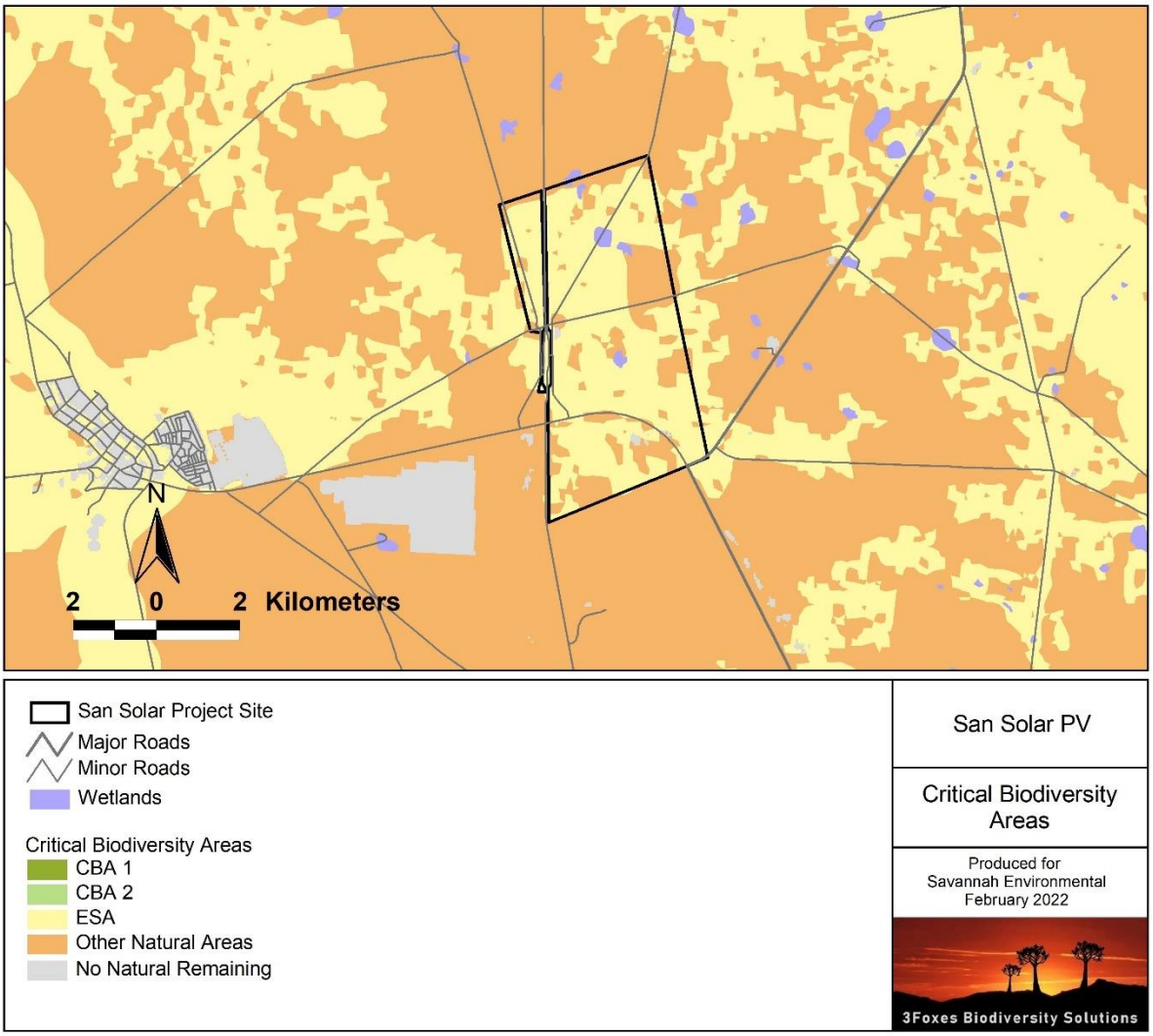

Figure 4. Extract of the Northern Cape Critical Biodiversity Areas map for the study area.

The ESAs present at the site are reflected as high sensitivity under the Terrestrial Biodiversity Theme of the DEA Screening Tool (Figure 5). As these are anthropogenic features not closely related to actual features on the ground, it is difficult to verify these features, but based on the available information, there is little ecological basis to support the ESAs at the site as compared to those areas within the site that are not classified as ESA. A preliminary assessment of the impact of the development on ESAs is provided in this report, and following the field assessment, a full detailed assessment will be provided.

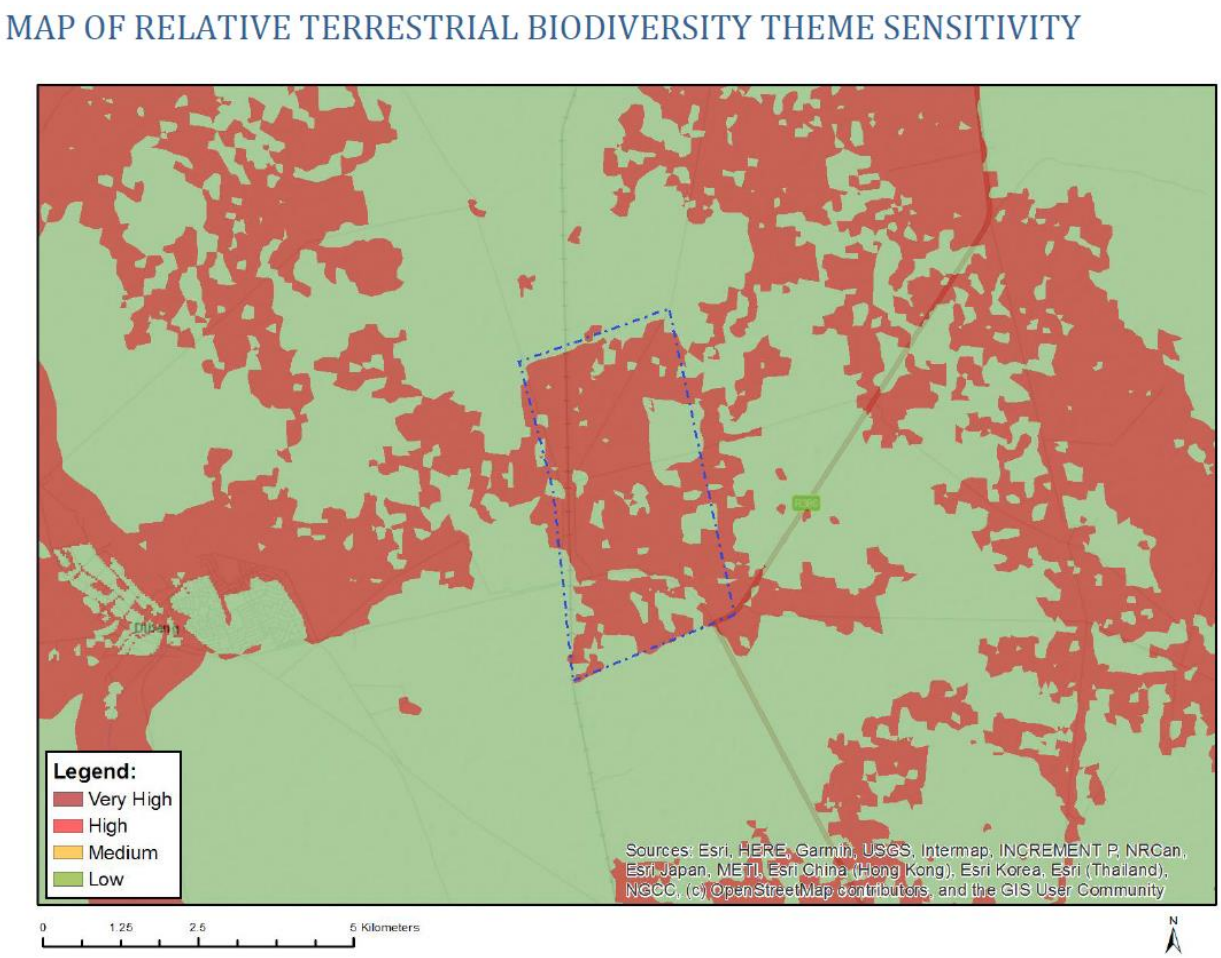

Figure 5. Terrestrial Biodiversity theme sensitivity for the San Solar site, showing the high sensitivity areas within the site related to the ESAs present.

3.5 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). There are also numerous planned and authorised facilities in the area most notably the Hyperion PV series of facilities east of the site and the Lekogo, Mogobe and Gaetsewe PV projects located east of Kathu south of the project site. The existing built plants occupy an area of about 900 ha and are considered to form part of the existing baseline for the area. The footprint of these are however relatively low in comparison with the footprint of the iron and manganese mines in the area, which is estimated at 12 000ha and are currently the major driver of habitat loss and transformation in the Hotazel-Kuruman-Kathu area. There are several authorised developments in the general vicinity to 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.

3.6 SITE SENSITIVITY ASSESSMENT

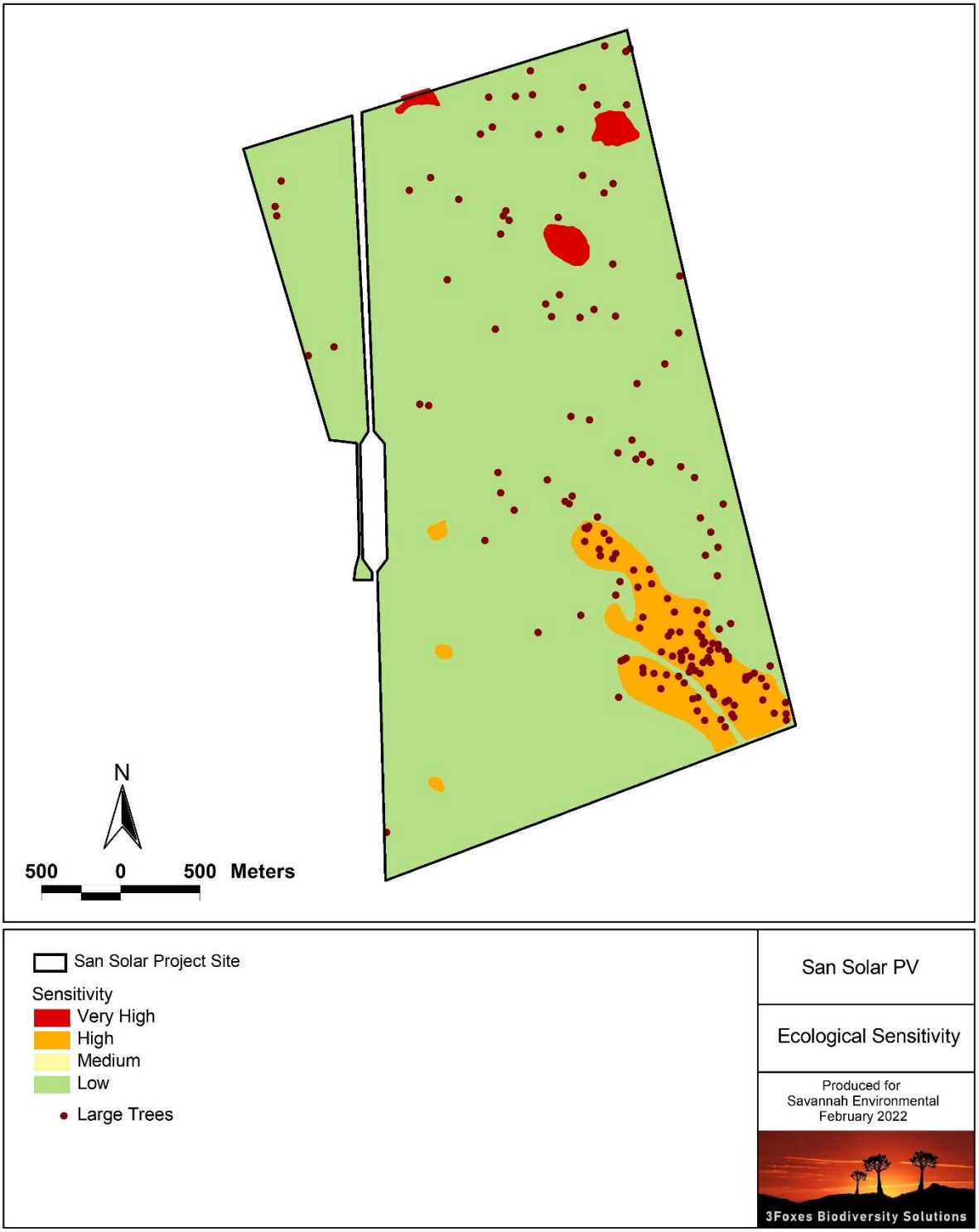

Figure 6. Sensitivity map for the San Solar PV site, showing the site sensitivity as well as the location of larger trees visible from the satellite imagery of the site.

The sensitivity map for the San Solar project site is illustrated above in Figure 6. The majority of the site consists of typical Kathu Bushveld dominated by *Senegalia mellifera* and *Tarchonanthus camphoratus*, which is considered low sensitivity on account of the generally low abundance of species of concern. In the south of the site, there is an area of deeper sands with a higher abundance of *Vachellia erioloba* which is considered High sensitivity and which should preferably be avoided by the PV development. Across the rest of the site there are numerous small pans present, of which the larger pans are considered Very High sensitivity and the smaller pans High sensitivity. The larger pans should be avoided, but the ecological significance of the smaller pans is relatively low and it would not significance increase the impact of the development of some of these smaller pans were lost to the development. Overall, provided that the PV development footprint can be accommodated within the lower sensitivity parts of the site, the impact of the development would be relatively low and would be considered acceptable.

4 IDENTIFICATION & NATURE OF IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the proposed development are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the proposed development are listed. The relevance and applicability of each potential impact to the current situation are then examined in more detail in the next section.

4.1 IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES

Potential ecological impacts resulting from the proposed development of the San Solar PV Development and associated 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:

Impacts on vegetation and protected plant species

Several protected species occur at the project site which may be impacted by the proposed development, most notably *Vachellia erioloba* and *Boscia albitrunca*. Vegetation clearing during construction will lead to the loss of currently intact habitat within the proposed development footprint and is an inevitable consequence of the proposed development. As this impact is certain to occur it will be assessed for the construction phase as this is when the impact will occur, although the consequences will persist for a long time after construction.

Direct faunal impacts

Increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction as well as operation and this impact will therefore be assessed for the construction phase and operational phase.

Habitat Degradation due to Alien Plant Invasion and Erosion

The disturbance created during construction would leave the site vulnerable to degradation due to erosion and alien plant invasion. Soil disturbance associated with the development will render the impacted areas vulnerable to erosion and measures to limit erosion will need to be implemented. Similarly, the disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some woody aliens such as *Prosopis* are already present in the area and additional alien plant invasion following construction is likely and regular alien plant clearing activities would be required. This impact would manifest during the operation phase, although some of the required measures to reduce this impact are required during construction.

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 ASSESSMENT OF IMPACTS

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

5.1 SAN SOLAR PV DEVELOPMENT

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. Although the project is currently in the Scoping Phase, a full assessment has been provided based on the assumption that the major sensitive features of the site will be avoided. As a significant amount of work has already been conducted at the site the baseline is considered sufficient to provide a preliminary assessment of the likely impacts associated with the development.

5.1.1 Planning & Construction Phase

Impact 1. Impacts on vegetation and listed or protected plant species resulting from construction activities

Impact Nature: Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the facility. In addition, there will be loss of individuals of protected tree species.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (5)	Moderate (4)
Probability	Definite (5)	Definite (5)
Significance	Medium (50)	Medium (45)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	This impact cannot be well-mitigated because the loss of vegetation and individuals of protected tree species is unavoidable and is a certain outcome of the development.	
Mitigation	• 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. • Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area. • 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.
Cumulative Impacts	The development will contribute to cumulative impacts on habitat loss and transformation in the area. Although large numbers of protected trees would be affected, these are the dominant trees of the area and cumulative impacts on their populations would be low.
Residual Risks	As the loss of currently intact vegetation is an unavoidable consequence of the development, the habitat loss associated with the development remains a moderate residual impact even after mitigation and avoidance of more sensitive areas.

Impact 2. Direct Faunal Impacts Due to Construction Activities

Impact Nature: Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction. Due to noise and operation of heavy machinery, faunal disturbance will extend well beyond the footprint and extend into adjacent areas. This will however be transient and restricted to the construction phase.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low to Medium (5)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (32)	Low (28)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No

Can impacts be mitigated?	Although the large amounts of noise and disturbance generated at the site during construction is largely unavoidable, impacts such as those resulting from the presence of construction personnel at the site can be easily mitigated.
Mitigation	• 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.
Cumulative Impacts	During the construction phase the activity would contribute to cumulative fauna disturbance and disruption in the area, but as there are still tracts of intact habitat in the area, it is likely that displaced fauna will have space to move about the site to avoid areas of high activity.
Residual Risks	It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.

Impact 3. Impacts On ESAs and VBroad-Scale Ecological Processes

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

Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To some degree, but the habitat loss associated with the project is largely unavoidable.	
Mitigation	• Minimise the development footprint within the high sensitivity areas. • There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora. • 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. • Disturbance on the site should be kept to a minimum during operation and maintenance activities.	
Residual Risks	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.	

5.1.2 Operational Phase Impacts

Impact 1. Faunal Impacts due to Operation

Impact Nature: The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (21)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	To a large extent, but some low-level residual impact due to noise and human disturbance during maintenance is likely.	
Mitigation	• 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. • 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. • All vehicles accessing the site should adhere to a low speed limit (30km/h max for heavy vehicles and 40km/h for light vehicles) to avoid collisions with susceptible species such as snakes and tortoises. • 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.
Cumulative Impacts	The development would contribute to cumulative disturbance for fauna, but the contribution would be low for most species and is not considered highly significant.
Residual Risks	Disturbance from maintenance activities will occur at a low level with the result that disturbance would be largely restricted to the site.

Operational Phase Impact 2. Habitat Degradation due to Erosion and Alien Plant Invasion

Impact Nature: Disturbance created during construction will leave the site and its immediate surroundings vulnerable to erosion and alien plant invasion for several years into the operational phase.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (2)	Short-term (1)
Magnitude	Medium (4)	Low (3)
Probability	Likely (4)	Likely (3)
Significance	Low (28)	Low (15)
Status	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	

Mitigation	• Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan. This should make provision for annual monitoring and rehabilitation. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and trees from the local area. • Alien management at the site should take place according to the Alien Invasive Management Plan. • Regular (annual) monitoring for alien plants during operation to ensure that no alien invasive problems have developed as result of the disturbance, as per the Alien Management Plan for the project. • Woody aliens should be controlled on at least an annual basis using the appropriate alien control techniques as determined by the species present.
Residual Risks	Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.

5.1.3 Decommissioning Phase

Decommissioning Phase Impact 1. Habitat Degradation due to Erosion and Alien Plant Invasion

Impact Nature: Disturbance created during decommissioning will leave the site vulnerable to erosion and alien plant invasion for several years.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (4)	Low (3)
Probability	Likely (4)	Likely (3)
Significance	Medium (32)	Low (21)
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	

Mitigation	• Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan. This should make provision for monitoring of the site for at least 5 years after decommissioning. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs, grasses and trees from the local area. • Alien management at the site should take place according to the Alien Invasive Management Plan. This should make provision for alien monitoring and management for at least 5 years after decommissioning. • Regular (annual) monitoring for alien plants during operation to ensure that no erosion problems have developed as result of the disturbance, as per the Alien Management Plan for the project. • 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.
Cumulative Impacts	Erosion and alien plant invasion would contribute to degradation in the area, but as this can be well-mitigated, the contribution can be minimised.
Residual Risks	Some erosion and alien plant invasion is likely to occur even with the implementation of control measures, but would have a low impact if effectively managed.

Decommissioning Phase Impact 2. Direct Faunal Impacts Due to Decommissioning Activities

Impact Nature: Due to disturbance, noise and the operation of heavy machinery, faunal disturbance due to decommissioning will extend beyond the footprint and impact adjacent areas to some degree. This will however be transient and restricted to the period while machinery is operational. In the long term, decommissioning should restore the ecological functioning and at least some habitat value to the affected areas.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Low (28)	Low (18)

Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Although the noise and disturbance generated at the site during decommissioning is probably largely unavoidable, this will be transient and ultimately the habitat should be restored to something useable by the local fauna.	
Mitigation	• 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 decommissioning activities should be removed to safety by an appropriately qualified environmental officer. • All vehicles should adhere to a low speed limit 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 and ultimately removed from the site as part of decommissioning. 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. • The site should be rehabilitated with locally occurring species to restore ecosystem structure and function.	
Cumulative Impacts	During the decommissioning, the associated disturbance would contribute to cumulative fauna disturbance and disruption in the area, but this would be transient and not of long-term impact.	
Residual Risks	Although some components of disturbance cannot be avoided, the site itself would have low faunal abundance at decommissioning and no significant residual impacts are likely.	

5.1.4 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. 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.

Impact Nature: 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.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (16)	Low (27)
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	Low	Low
Can impacts be mitigated?	Only partly as a significant proportion of the impact results from the presence and operation of the facility which cannot be well mitigated.	
Mitigation	• Avoid impact on the sensitive features of the site such as the larger pans and the deeper sands in the south of the site. • 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. • 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.	
Residual Risks	The presence of the various facilities will represent an obstacle for some fauna which would contribute to fragmentation in the area.	

6 CONCLUSION & RECOMMENDATIONS

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 of the site which are considered high sensitivity and which should be avoided.

Based on the previous walk-through study of the site, it is expected to have a moderate to low density of *Vachellia erioloba* and *Boscia albitrunca*. These species are however abundant in the area and the local populations would not be compromised to any degree by the loss of

individuals within the PV footprint. In terms of fauna, there are few species of conservation concern that are likely to be present or abundant at the site and the primary impact of the development on fauna would be some habitat loss for the more common resident species. As such, no high long-term post-mitigation impacts on fauna are expected to occur as a result of the Sun Solar PV development.

The development footprint of the San Solar PV Development facility can be restricted to low and moderate sensitivity habitat common in the Kathu-Hotazel-Kuruman area. The majority of the site is considered suitable for development and while there are habitats that should be avoided, these occupy a small proportion of the site. Although cumulative impacts in the wider Kathu area are currently on the increase due to the expansion of the mines and the proliferation of solar PV facilities in the area, these still occupy a small proportion of the Kathu Bushveld vegetation type and the contribution of the current development to cumulative impact would be low and is considered acceptable. Overall, there are no potential impacts associated with the proposed development that are considered to be of high significance and which cannot be mitigated to an acceptable level. As such, there are no fatal flaws or other major impediments that should prevent the development from proceeding into the EIA Phase. A plan of study for the EIA phase is detailed below.

Plan of Study for EIA phase

- Verify, in the field the draft sensitivity map as contained in this report. Particular attention would be paid to the pans that are present within the site as well as the area of deeper sands in the south of the site. This would confirm the sensitivity and no-go areas associated with these features.
- Assess the density of protected trees at the site, in particular *Vachelia erioloba* and *Boscia albitrunca*. Should the density of these species be significantly higher than that estimated in the current study, the possibility of the need for an offset would be investigated.
- Check the habitat on-site to verify the potential presence of fauna of concern. Should the habitat suggest that species of concern may be present, specific measures to confirm the presence of such species on the site will be implemented as appropriate.
- Validate the ESAs that are present on the site and assess whether or not these are located within the most appropriate areas and if not, provide evidence and maps to indicate the actual likely location of areas of higher importance for ecological processes.
- Verify the nature and quality of the affected habitat in order to better assess the cumulative impacts that are likely to result from the development of the site as a PV facility.

- Identify any additional mitigation and avoidance measures for inclusion in the EMPr that should be implemented to further reduce the impacts of the development on terrestrial biodiversity.

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

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

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

ZYGOPHYLLACEAE	*Tribulus terrestris*	LC

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

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

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

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

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).

Family	Genus	Species	Common name	Red list category
Brevicepitidae	*Breviceps*	*adspersus*	Bushveld Rain Frog	Least Concern
Bufonidae	*Amietophrynus*	*gutturalis*	Guttural Toad	Least Concern
Bufonidae	*Amietophrynus*	*poweri*	Power's Toad	Least Concern
Bufonidae	*Amietophrynus*	*rangeri*	Raucous Toad	Least Concern
Bufonidae	*Poyntonophrynus*	*vertebralis*	Southern Pygmy Toad	Least Concern
Bufonidae	*Vandijkophrynus*	*gariepensis*	Karoo Toad	Least Concern
Pipidae	*Xenopus*	*laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia*	*angolensis*	Common or Angola River Frog	Least Concern
Pyxicephalidae	*Cacosternum*	*boettgeri*	Common Caco	Least Concern
Pyxicephalidae	*Pyxicephalus*	*adspersus*	Giant Bull Frog	Least Concern
Pyxicephalidae	*Tomopterna*	*cryptotis*	Tremelo Sand Frog	Least Concern