ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED GAETSEWE SOLAR PV FACILITY AND ASSOCIATED INFRASTRUCTURE, KATHU, NORTHERN CAPE:

FAUNA & FLORA SPECIALIST EIA REPORT

Cape EAPrac

PRODUCED FOR CAPE EAPRAC

BY

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EXECUTIVE SUMMARY

K2018091758 (South Africa) (Pty) Ltd is proposing the establishment of a commercial 75 MW photovoltaic (PV) solar energy facility (SEF), called Gaetsewe Solar, on the farm Legoko Farm No 460 Portion 2, near Kathu in the Northern Cape. The development is currently in the EIA Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity EIA study of the development site as part of the EIA process.

A full field assessment as well as a desktop review of the available ecological information for the area was conducted in order to identify and characterise the ecological features of the site. The site falls within the Kathu Bushveld vegetation type, which is a relatively localised vegetation type for an arid area, but has not been significantly impacted by transformation and is classified as Least Threatened. The vegetation of the preferred Alternative 1 consists of degraded *Tachonanthus camphoratus* scrub, with few species or features of concern present across most of the site. Impacts on fauna and flora associated with the development on this site are likely to be low and no high post-mitigation impacts are likely. The Alternative 2 option occurs within good condition rangeland with a high abundance of *Acacia erioloba* and *Acacia haematoxylon*. This is the less preferred alternative from an ecological perspective and would generate significantly higher impacts on fauna, flora and ecological processes than the preferred alternative. The grid connection for the development is relatively short and while it would likely require the clearing of some *Acacia erioloba* trees, the overall footprint and impact of the grid connection would be low and would generate low impacts on fauna and flora.

Cumulative impacts associated with the development are a concern. However, the loss of the habitat within the preferred alternative is not considered highly significant, given the degraded nature of the site and the location and ecological context of the site. As a result, the overall cumulative impact of the development is considered likely to be low.

Impact Statement

The development footprint of the Alternative 1 Gaetsewe Solar PV facility is restricted largely to low sensitivity habitat within the site. The affected area is considered suitable for development and there are no impacts associated with the Gaetsewe Solar PV facility that cannot be mitigated to a low level. As such there are no fatal flaws or high post-mitigation impacts that should prevent the development from proceeding. Based on the layout provided for the assessment, the Gaetsewe Solar PV facility can be supported from a terrestrial ecology point of view. The Gaetsewe Solar grid connection with associated infrastructure is likely to generate low impacts on fauna and flora after mitigation. No high impacts that cannot be avoided were observed and from a flora and terrestrial fauna perspective, there are no reasons to oppose the development of the grid connections and associated infrastructure.

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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;	4
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	6
c) an indication of the scope of, and the purpose for which, the report was prepared;	7-11
(cA) an indication of the quality and age of base data used for the specialist report;	11-12
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	12-26
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	12
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	11-13
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;	25
g) an identification of any areas to be avoided, including buffers;	25-26
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;	26
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	13-14
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	30-35
k) any mitigation measures for inclusion in the EMPr;	30-35
l) any conditions for inclusion in the environmental authorisation;	
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	
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;	35-36
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 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).

Skills & Primary Competencies

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

Tertiary Education:

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

Employment History

- 2009 – Present – Sole Proprietor of Simon Todd Consulting, providing specialist ecological services for development and research.
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.

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

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 as amended 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: ____30 October 2018_____

1 INTRODUCTION

K2018091758 (SOUTH AFRICA) (Pty) Ltd. (the applicant) is proposing the establishment of a commercial photovoltaic (PV) solar energy facility (SEF), called Gaetsewe Solar, on the farm Legoko Farm No 460 Portion 2, situated in the District of Kuruman Rd, Northern Cape Province, within the jurisdiction area of the Gamagara Local Municipality. Gaetsewe Solar will have a net generating capacity of 75 MWAC with an estimated maximum footprint of ± 212 ha. The applicant has appointed Cape EAPrac to undertake the required application for environmental authorisation process for the above development. The development is currently in the EIA Phase and the applicant has appointed 3Foxes Biodiversity Solutions to provide a specialist terrestrial ecology study of the development site as part of the EIA process.

The purpose of the Gaetsewe Solar Terrestrial Biodiversity EIA Phase Report is to describe and detail the ecological features of the proposed PV project site, provide an assessment of the ecological sensitivity of the site and identify the likely impacts associated with the development of the site as a solar PV facility. Several site visits as well as a desktop review of the available ecological information for the area were conducted in order to identify and characterise the ecological features of the site. This information is used to derive an ecological sensitivity map which has been used to inform the layout of the development. Impacts are assessed for the preconstruction, construction, operation, and decommissioning phases of the development. 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. The full scope of study is detailed below.

1.1.1 SCOPE OF STUDY

The scope of the study includes the following activities

- a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project
- a description and evaluation of environmental issues and potential impacts (incl. using direct, indirect and cumulative impacts) that have been identified
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- an indication of the methodology used in determining the significance of potential environmental impacts
- an assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria:

  - the nature of the impact, which shall include a description of what causes the effect, what will be affected, and how it will be affected
  - the extent of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
  - the duration of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0-5 years), medium-term (5- 15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity), or permanent
  - the probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood) probable (distinct possibility), highly probable (most likely), or definite (Impact will occur regardless of any preventable measures)
  - the severity/beneficial scale indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight, or have no effect
  - the significance which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high
  - the status which will be described as either positive, negative or neutral
  - the degree to which the impact can be reversed
  - the degree to which the impact may cause irreplaceable loss of resources
  - the degree to which the impact can be mitigated

- a description and comparative assessment of all alternatives
- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr)
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- a description of any assumptions uncertainties and gaps in knowledge
- an environmental impact statement which contains:
  - a summary of the key findings of the environmental impact assessment;
  - an assessment of the positive and negative implications of the proposed activity;
  - a comparative assessment of the positive and negative implications of identified alternatives.

General Considerations:

- Disclose any gaps in information or assumptions made.
- 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 Environmental Management Plan (EMP) for faunal related issues.

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

- Preconstruction
- Construction
- Operational Phase

1.2 ASSESSMENT APPROACH & PHILOSOPHY

This assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 982) in terms of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA). This includes adherence to the following broad principles:

- That a precautionary and risk-averse approach be adopted towards 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. Critical Biodiversity Areas (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas.

- Demonstrate how the proponent intends complying with the principles contained in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (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.

These principles serve as guidelines for all decision-making concerning matters that may affect the environment. As such, it is incumbent upon the proponent to show how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by the NEMA.

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 will include data searches, desktop studies, site walkovers / field survey of the property and baseline data collection, describing:

- A description of 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

- Red Data Book (RDB) species (giving location if possible using GPS)
- The viability of an estimated population size of the RDB species that are present (include 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 RDB species, or species of conservation concern, 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 (SSC) 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 Environmental Management Plan (EMP) 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 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.

1.3 RELEVANT ASPECTS OF THE DEVELOPMENT

The proposed preferred development site is located south of Kathu on Portion 2 of Farm 460 situated in the District of Kuruman RD, Northern Cape Province, with an overall extent of 856ha (Figure 1). The alternative site is located on the adjacent property Legoko 460/1. The development will require approximately 212ha of the site and will consist of the following:

- » PV and/or concentrated PV with fixed, single- or double axis- tracking technology. The actual technology to be used will be decided at a later date.
- » The grid connection would be to the Eskom Ferrum Substation via the proposed Sekgame Switching yard located west of the site.
- » A Facility Substation located on Portion 2 of Farm 460.
- » Auxiliary buildings of approximately 1ha. The functions within these buildings include (but is not limited to) ablutions, workshops, storage areas/warehousing, control room and site offices. Fencing height shall be below 5m, but expected to be approximately 3m.
- » Access roads are expected to be 6m in width, but less than 8m in width.
- » Approximately 2-5ha of laydown area will be required, but will not exceed 5ha.

Figure 1. Satellite image of the Gaetsewe Solar study site, illustrating the two Legoko 460 property boundaries in black and the preferred Alternative 1 in the north and the Alternative 2 in the south, as well as the power line route to the proposed Sekgame switching station.

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 (Mucina & Rutherford 2006 and 2012 Powrie update) as well as the National List of Threatened Ecosystems (2011), where relevant.
- Information on plant species recorded for the broad area around the site was extracted from the SANBI POSA database hosted by SANBI. The species list was derived from a considerably larger area than the study site, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself or the immediate area has not been well sampled in the past.
- The 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 (2018).

Ecosystem

- Critical Biodiversity Areas (CBAs) were extracted from the Northern Cape Critical Biodiversity Areas Map (Oosthuysen & Holness 2016).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment (NFEPA) (Nel et al. 2011).
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).

Fauna

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and Animal Demography Unit (ADU) Virtual Museum spatial database (http://vmus.adu.org.za/).
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- Apart from the literature sources, additional information on fauna was extracted from the ADU web portal http://vmus.adu.org.za
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.
- 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 (2018).

2.2 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 of the site as well as personal knowledge of the 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:

Sensitivity	Description
Low	Units with a low sensitivity where there is likely to be a low impact on ecological processes and terrestrial biodiversity. This category represents transformed or natural areas where the impact of development is likely to be local in nature and of low significance with standard mitigation measures.
Medium	Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impacts such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
High	Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
Very High/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.

2.3 SAMPLING LIMITATIONS AND ASSUMPTIONS

The current study consisted of a detailed field assessment as well as a desktop study, which serves to significantly reduce the limitations and assumptions required for the study. In addition, the site has been previously visited (March 2015) and assessed by the consultant as part of the AEP Legoko PV development (DEA 14/12/16/3/3/2/819). For the current assessment, the vegetation was in an excellent condition for sampling at the time of the field assessment with the result that there are few limitations with regards to the vegetation sampling and the timing of the site visit. The plant species lists obtained from the field assessment are therefore considered comprehensive and reliable.

In terms of fauna, a number of activities and steps have been taken to obtain a reliable indication of the faunal community in the area. Sherman trapping for small mammals was conducted at the site in order to better characterise the small mammal community and while the sampling period was short, this provides a reliable insight into the dominant species present. Camera trapping has previously been conducted in the immediate area for a variety of other studies, and this information is used here to inform the mammalian community structure at the site. Apart from the active searches that were conducted for reptiles and amphibians during the current study, additional species presence is inferred based on results obtained from the previous studies the consultant has conducted in the immediate area. However, many fauna are difficult to observe in the field and their potential presence at the site is evaluated based on the literature and available databases. Many remote areas have not been well-sampled with the result that the species lists derived for the area do not always adequately reflect the actual fauna present at the site. This is acknowledged as a limitation of the study however it is substantially reduced by the previous extensive experience in the area. In order to further reduce this limitation, and ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study site and are likely to include a much wider array of species than actually occur at the 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 site is restricted to the Kathu Bushveld vegetation type. 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 largely intact and less than 2% has been transformed by mining activity and it is classified as Least Threatened. It is, however, poorly conserved and does not currently fall within any formal conservation areas. 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 *Acacia luederitzii* var *luederitzii, Anthephora argentea*, *Megaloprotachne albescens*, *Panicum kalaharense* and *Neuradopsis bechuanensis*. It is more fully described as it occurs at the site in the next section. Other vegetation types that occur in the immediate area include Kuruman Thornveld and Kuruman Mountain Bushveld, neither of which is of conservation concern or occur at the site.

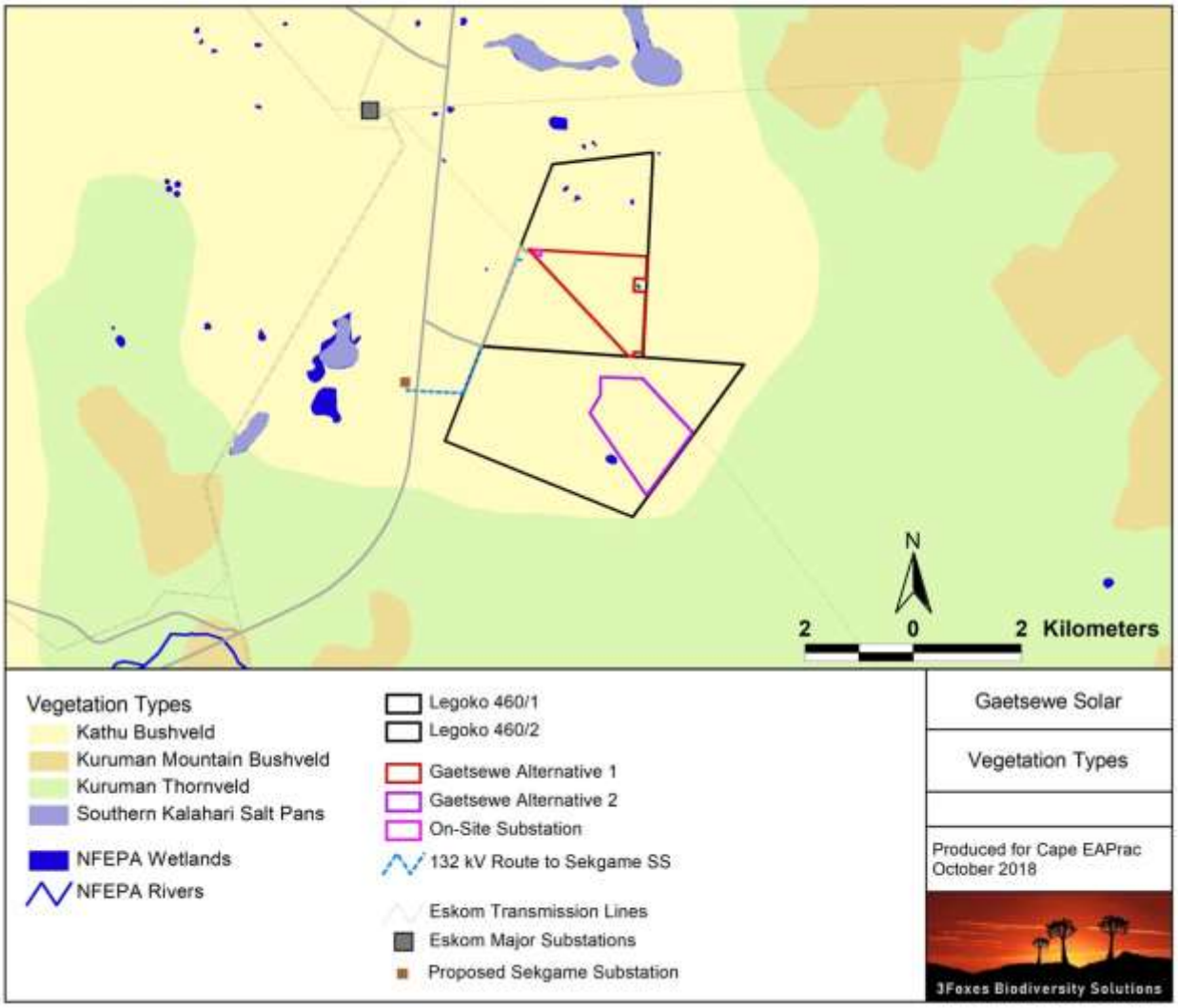

Figure 2. Broad-scale overview of the vegetation in and around the Gaetsewe Solar site. The vegetation map is an extract of the national vegetation map as produced by Mucina and Rutherford (2006/2012), and also includes wetlands delineated by the NFEPA assessment (Nel et al. 2011). There are no observed or mapped drainage lines within the site.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 HABITATS & PLANT COMMUNITIES

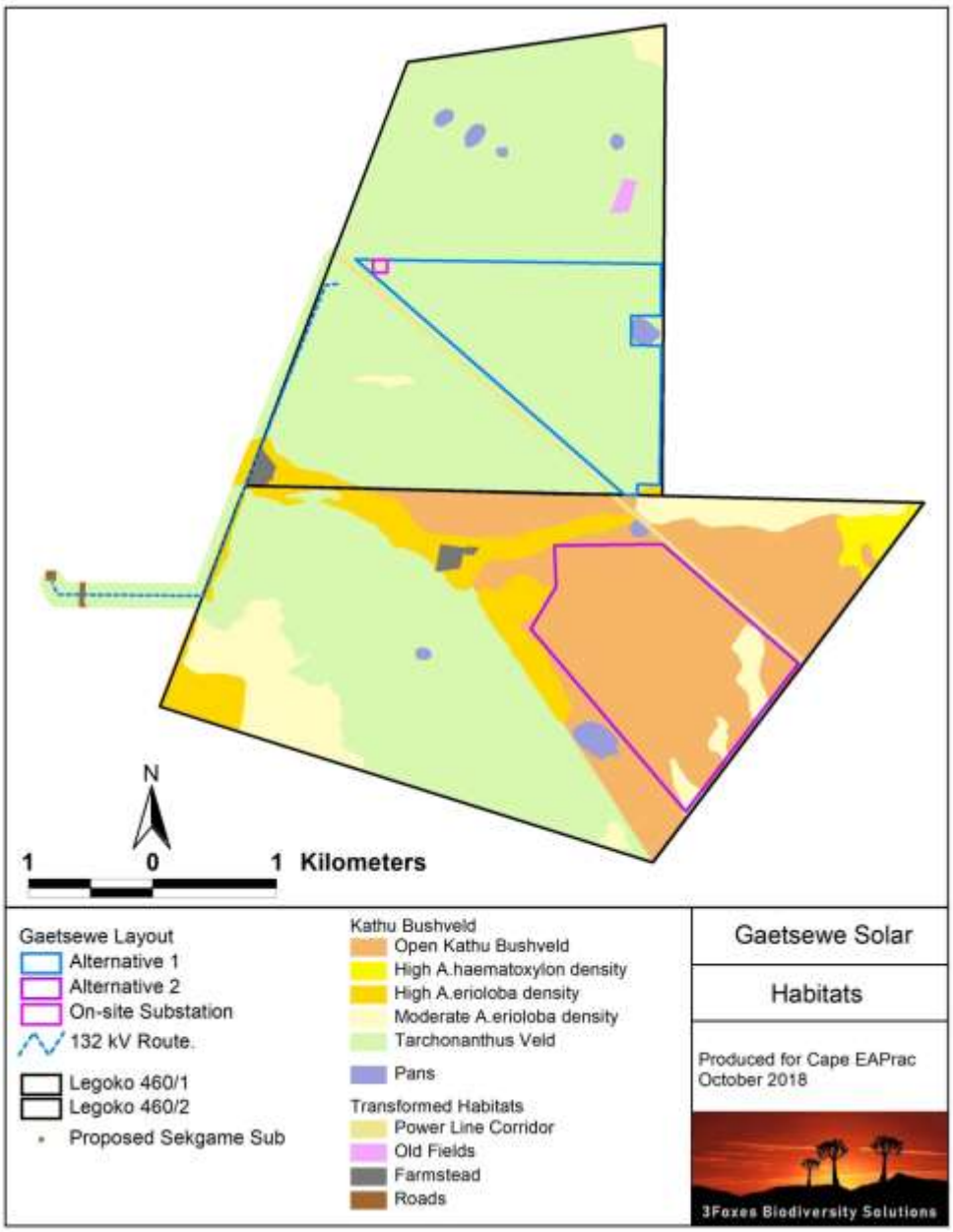

Figure 3. Habitat map of the study area, showing the different sub-communities identified within the Kathu Bushveld vegetation type.

The different habitats observed at the site are mapped above in Figure 3. The vegetation of the preferred site is fairly homogenous and consists largely of low, fairly dense

Tachonanthus camphoratus scrub, with occasional more open areas or small stands of *Acacia erioloba*. Differences in vegetation composition along the boundaries of Legoko 460/2 (the northern property) with neighbouring properties suggest that the vegetation composition of Legoko 460/2 is in a degraded state and that the high density of *Tachonanthus camphoratus* which characterises the property is the result of poor historical management. The vegetation on Legoko 460/1 is considered to be in a better, more natural condition and better corresponds with the description of Kathu Bushveld. However, large parts of Legoko 460/2 are on shallow soils overlying calcrete, which across the broader Kathu region tend to be dominated by *Tarchonanthus* or *Acacia mellifera* with few larger trees such as *Acacia erioloba* present. Nevertheless, the density and dominance of *Tachonanthus camphoratus* across much of Legoko 460/2 is most likely the result of excessive burning to improve the vegetation quality for grazing. Within Legoko 460/2 the *Tarchonanthus*-dominated shrubland is the predominant community present across the site and no other major vegetation communities can be recognised within this property. There are however a few small pans present both on Legoko 460/2 and Legoko 460/1, which are considered sensitive features of the landscape which should be avoided as much as possible. There are no rocky outcrops within the study area, which has very little topographic diversity and is restricted to flat plains. There are no drainage lines within the site and the nearest significant drainage feature is the Gamagara River which occurs approximately 10km south west of the site. The different vegetation communities present at the site are described below.

Tarchonanthus Shrubland

The majority of Legoko 460/2 consists of *Tarchonanthus camphoratus* shrubland (Figure 4) but with occasional more open areas (Figure 5). This community usually consists of a dense shrubland about 2m tall, dominated by *Tarchonanthus camphoratus* with other tall shrubs and trees present including *Zizyphus mucronata*, *Gymnosporia buxifolia*, *Acacia erioloba*, *Acacia karroo*, *Acacia mellifera* subsp. *detinens*, *Searsia ciliata*, *Ehretia rigida* subsp. *rigida*, *Diospyros lycioides* subsp. *lycioides* and *Grewia flava*. The grass layer is dominated by species such as *Aristida meridionalis, Aristida stipitata* subsp. *stipitata*, *Cymbopogon popischilli, Cynodon dactylon, Enneapogon cenchroides, Eragrostis lehmanniana, Eragrostis nindensis, Pogonarthria squarrosa*, *Schmidtia pappophoroides, Stipagrostis uniplumis* var. *uniplumis* and Aristida *congesta* subsp. *congesta*. Common low shrubs include *Asparagus laricinus*, *Asparagus retrofractus*, *Chrysocoma ciliata*, *Felicia muricata* subsp. c*inerascens*, *Pentzia calcarea*, *Acacia hebeclada*, *Hermannia tomentosa*, *Gnidia polycephala* and *Lantana rugosa*. Forbs were abundant at the time of the field assessment and common species present include *Dicoma schinzii*, *Geigeria ornativa*, *Elephantorrhiza elephantina*, *Indigofera daleoides* var. *daleoides* and *Gisekia pharnacioides* var. *pharnacioides*. Weedy and alien species are common in disturbed places and include *Tribulus terrestris*, *Gomphrena celosioides*, *Osteospermum muricatum*, *Verbesina encelioides*, *Heliotropium ciliatum* and

Datura stramonium. Occasional *Prosopis* trees are also present at the site, usually around watering points.

Figure 4. Dense *Tarchonanthus camphoratus*-dominated veld within the preferred alternative. Diversity within these areas is low and the grass layer is also dominated by unpalatable species.

Figure 5. Example of an area of more open grassland within the footprint of the preferred

alternative, with a small stand of *Acacia erioloba* in the background. Apart from the pictured stand, there are no other significant stands of *Acacia erioloba* within the footprint of this alternative.

Pans

There is a small pan along the eastern margin of the preferred alternative 1 footprint area (Figure 6). This pan is similar to the other small pans that are present in the area. The floor of the pan is dominated by species such as *Vahlia capensis*, *Osteospermum muricatum*, *Cullen tomentosum*, *Gisekia pharnacioides* var. *pharnacioides*, *Selago dinteri*, *Enneapogon desvauxii*, *Eragrostis biflora* and *Geigeria ornativa*. The margins of the pans are usually dominated by *Acacia mellifera* and *Zizyphus mucronata* with occasional *Seasia lancea* before quickly giving way to more normal *Tarchonanthus* scrub. The pans are a small feature of the landscape, but are used disproportionately by terrestrial fauna as well as birds. These areas are considered sensitive features of the landscape and should be buffered from development by at least 100m, as has been applied in the assessed layout.

Figure 6. The small pan present along the eastern margin of the preferred alternative. These pans are considered sensitive features of the landscape and should be avoided by the development.

Acacia erioloba Thornveld

Alternative 2 is located on the property Logoko 460/1 immediately south of the preferred alternative on Logoko 460/2. The habitat in this area is considered to be in a better condition than the veld on Legoko 460/2 and consists of mixed *Acacia erioloba* thornveld (Figure 7, Figure 8) which broadly corresponds to the Kathu Bushveld vegetation type as described by Mucina and Rutherford (2006). The vegetation is generally much more open than within the preferred alternative, although there are still some areas present where *Tarchonanthus camphoratus* is dominant. As a result of the lower tree cover, the grass layer on Legoko 460/1 is better developed and is a much more important component of the vegetation in terms of cover and biomass. The woody layer within the alternative site is dominated by the trees *Acacia erioloba* and *Zizyphus mucronata*, with a variable tall shrub layer consisting of *Tarchonanthus camphoratus*, *Acacia haematoxylon*, *Gymnosporia buxifolia*, *Searsia ciliata*, *Ehretia rigida* subsp. *rigida*, *Diospyros lycioides* subsp. *lycioides* and *Grewia flava*. The grass layer is largely composed of similar species to within the preferred alternative, but the dominance has shifted towards more palatable species. Dominant and characteristic species include *Schmidtia pappophoroides*, *Aristida meridionalis, Aristida stipitata* subsp. *stipitata*, *Stipagrostis uniplumis* var. *uniplumis*, *Stipagrostis obtusa*, *Cynodon dactylon, Enneapogon desvauxii, Eragrostis lehmanniana,* and Aristida *congesta* subsp. *congesta*. Due to the high grass density, forb abundance is not as high as within the preferred alternative, but the overall composition and diversity is very similar. The general sensitivity of the alternative site is considered higher than the preferred alternative, due to the greater ecological functioning of the alternative site as well as the significantly high abundance of protected tree species, especially *Acacia erioloba* and *Acacia haematoxylon*.

Figure 7. Open *Acacia erioloba* bushveld near to the north eastern boundary of Alternative 2, showing the low bush density compared with the majority of the Alternative 1 area.

Figure 8. *Acacia erioloba* bushveld in the south of Alternative 2, with *Acacia erioloba*, *Acacia haematoxylon* and *Tarchonanthus camphoratus* being prominent woody species present.

4.2 LISTED AND PROTECTED PLANT SPECIES

Two NFA-protected tree species occur at the site, *Acacia erioloba* and *Acacia haematoxylon*. The density of both species within the preferred alternative is low and a significant impact on the local population of either species would not occur as a result of the development of this area. The density of these species within the alternative site is relatively high and there would be hundreds if not thousands of individuals within the development footprint. As a result, it is clear that the preferred site would generate significantly lower impact on protected tree species than the alternative site. Apart from the above species, there are occasional Wild Olive trees *Olea europaea* subsp. *cuspidata* present at the site, which are provincially protected, but these occur at a low density and few individuals would be impacted under either alternative. *Boophone disticha* is no longer listed as declining, but is provincially protected and a few individuals would likely be lost to the development. No other species of significant conservation concern were observed at the site and it is not likely that there any important populations of any such species present that were not observed given the favourable conditions at the time of the assessment.

4.3 FAUNAL COMMUNITIES

4.3.1 Mammals

The mammalian community of the general area is of moderate diversity, with as many as 44 terrestrial mammals potentially occurring in the area. The habitat diversity of the preferred site is low and the homogenous *Tarchonanthus*-scrub is not likely to have high mammal diversity. Species captured, observed or otherwise confirmed present at the site include Aardvark, Cape Porcupine, Springhare, South African Ground Squirrel, Vervet Monkey, Small-spotted Genet, Yellow Mongoose, Slender Mongoose, Black-Backed Jackal, Steenbok, Duiker and Kudu. Small mammals trapped in the area on the current or previous site visits 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), Ground Pangolin *Smutsia temminckii* (Vulnerable) and South African Hedgehog *Atelerix frontalis* (Vulnerable). The Brown Hyaena is 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 is probably present in the area given that it occurs within arid, open country. The Ground Pangolin may also occur in the area at typically low density, but usually favours more typical savannah on deep red sands and not the calcrete soils that characterise much of the site. Given the extensive

national ranges of these species, the impact of the development on habitat loss for these species would be minimal and a long-term impact on these species would be unlikely.

Figure 9. Mammals observed at the site include from top left, Black-backed Jackal, Slender Mongoose, Bushveld Gerbil and Hairy-footed Gerbil.

4.3.2 Reptiles

The Gaetsewe site lies in or near the distribution range of at least 37 reptile species, of which about 30 have been observed in the area according to the ReptileMap database (Appendix 3). This is a comparatively low total suggesting that the site has relatively low reptile species richness. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 1 terrapin, 2 tortoises, 15 snakes, 13 lizards and skinks, and 5 geckos. No species of conservation concern are known to occur in the area. The habitat diversity within the study area is relatively low as no rocky outcrops or drainage lines are present within the study area. As a result, the number of reptile

species present within the 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 site itself.

Species observed at the site or in the area in the past include 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*, 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 areas.

Figure 10. Reptiles observed at the site include clockwise from top left, Ground Agama, Variable Skink, Cape Gecko and Speckled Rock Skink.

4.3.3 Amphibians

The site lies within or near the range of 11 amphibian species, indicating that the site potentially has a moderately diverse amphibian community for an arid area. There is however no natural permanent water or artificial earth dams within the site that would represent suitable breeding habitat for most of these species. The pans that are present at the site would occasionally contain sufficient water for breeding purposes for those species that 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 observed in the area include Eastern Olive Toad *Amietophrynus garmani* and Bushveld Rain Frog *Breviceps adspersus*, both of which are likely to occur at the site. While Rain Frogs do not have a free-swimming phase, as the tadpoles mature in an underground nest, the Olive Toads are likely to breed in the small pans present at the site when the opportunity arises.

The only species of conservation concern which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus*. The site lies at the margin of the known distribution of this species and it has not been recorded from any of the quarter degree squares around the site, suggesting that it is unlikely to occur at the site. Impacts on amphibians are however likely to be low and restricted largely to habitat loss during construction.

4.4 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 11. The site lies within an area classified as "Other natural areas" and is not classified as a CBA or ESA. There are no CBAs in close proximity to the site, indicating that the development does not pose a threat to any CBAs or other areas considered to be of significance from a broad-scale conservation planning perspective. The field assessment confirms that there are no specific features within the site that would warrant their inclusion in the CBA map as the habitats present are well-represented in the area and these features are therefore likely captured elsewhere in the CBA map. Development within CBAs is undesirable for a variety of reasons, and the lack of any CBAs in close proximity to the site, highlights the potential suitability of the site for the development.

There are no NPAES focus areas or Northern Cape PAES focus areas within or in close proximity to the site. As a result, the development is not likely to significantly impact the ability to meet conservation targets nationally or within the province.

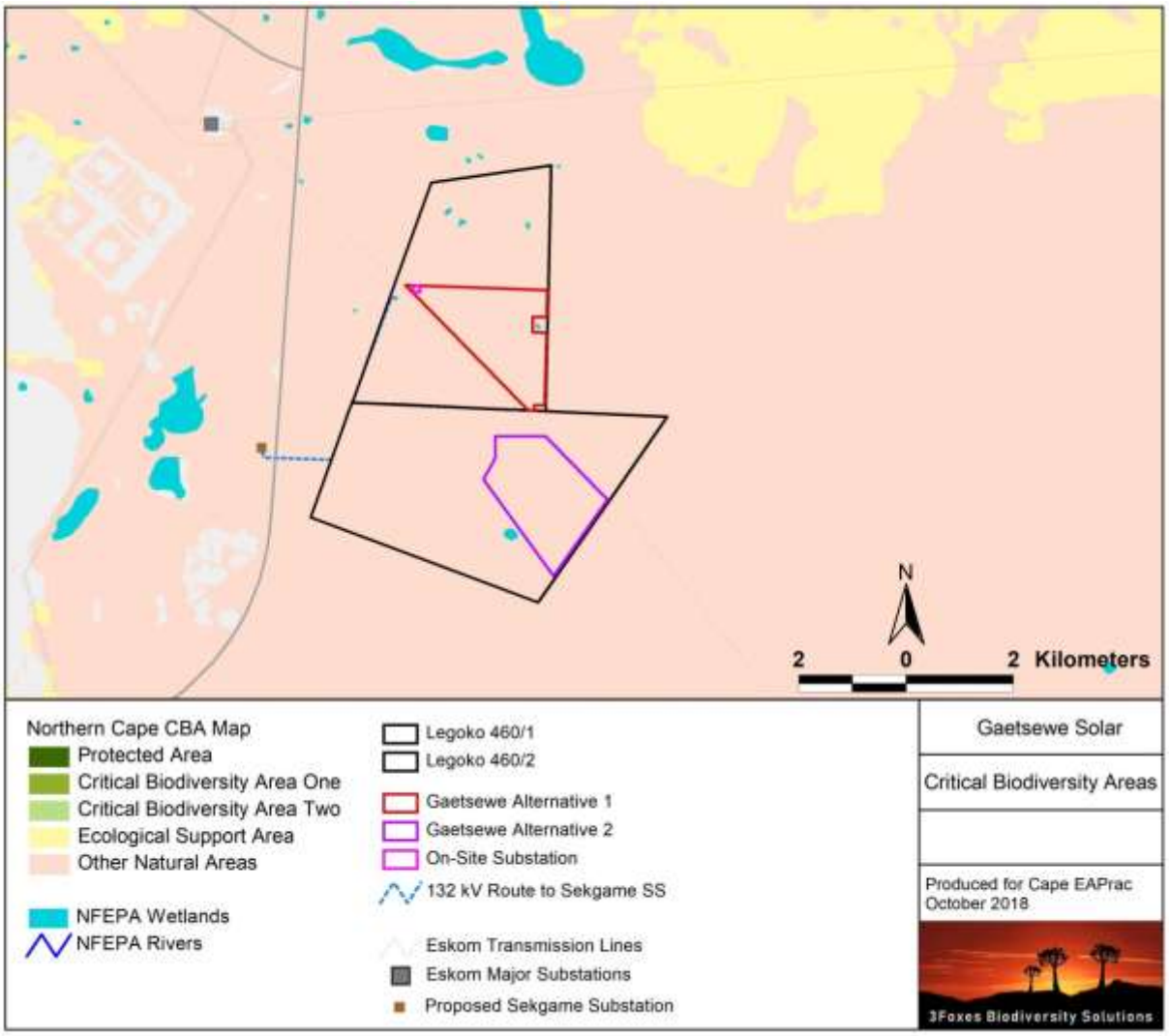

Figure 11. Extract of the Northern Cape Critical Biodiversity Areas map for the study area, showing that there are no CBAs in close proximity to the site.

4.5 CURRENT BASELINE & CUMULATIVE IMPACT

There are several existing PV projects in the Kathu area including the already built Kalahari Solar, Kathu Solar and Sishen Solar Farms. These cover an area of 950ha and are considered to form part of the existing baseline for the area and represent existing impacts to the area. The 950ha footprint of these is however small in comparison with the iron and manganese mines in the area, which with an existing footprint of at least 12 000ha are currently the major driver of habitat loss and transformation in the area. There are several authorised PV developments in close vicinity to the Gaetsewe site, including the Legoko Solar PV facility on the same property as the current development, the Kathu Solar PV facility immediately east of the site and the Mogobe Solar PV facility on the same property as the alternative site for the current development. These would result in approximately

700ha of habitat loss should they all go ahead. The density and extent of development in the area raises potential concern around cumulative impact in the area. However, the overall development pressure in the wider area is still low and the proximity of the current development and those on the adjacent properties to Kathu and active mining activity means that the site is not likely to be of high significance for landscape connectivity. In addition, the proximity of several other PV developments in the immediate area is seen as a positive aspect of the development as a relatively confined node of development in a relatively low sensitivity area is seen as preferable to scattered developments across a wider area which is likely to include less favourable habitats for development. The overall extent of cumulative impact due to all the solar energy development in the area is seen to be relatively low and currently stands at less than 0.2% of the extent of Kathu Bushveld. The additional unbuilt projects from the area would contribute even less than this and the potential contribution of the Gaetsewe Solar PV development at 212ha would represent about 0.03% of the extent of Kathu Bushveld and as such considered to have local significance only. In addition, it is important to note the degraded nature of the site and the comparatively low value of this area compared to better condition vegetation elsewhere in the area.

Figure 12. Map of DEA registered renewable energy applications as at July 2018. The site is already highlighted as a renewable energy development site due to the existing Legoko Solar project.

4.6 SITE SENSITIVITY ASSESSMENT

The sensitivity map for the Gaetsewe Solar study area is illustrated below in **Error! Reference source not found.**. The Alternative 1 development area is considered to be low sensitivity *Tarchonanthus* scrub. It is likely that development of the solar facility in this area would generate low impacts on fauna and flora. The Alternative 2 development area is considered to be Medium sensitivity and represents habitat with a much higher ecological condition than the preferred alternative and also has a much higher density of protected tree species. It is clear the preferred alternative is supported by the current study and the Alternative 2 development area is not considered to be a suitable area for the development of a solar facility. With the development of the preferred alternative, the project would result in some habitat loss for fauna of minor local significance, and some loss of poor condition Kathu Bushveld vegetation with a low abundance of species of conservation concern. There are no species or habitats of high conservation concern that are likely to be significantly impacted by the development, and no critical flaws present in terms of site sensitivities that should prevent the project from going forward.

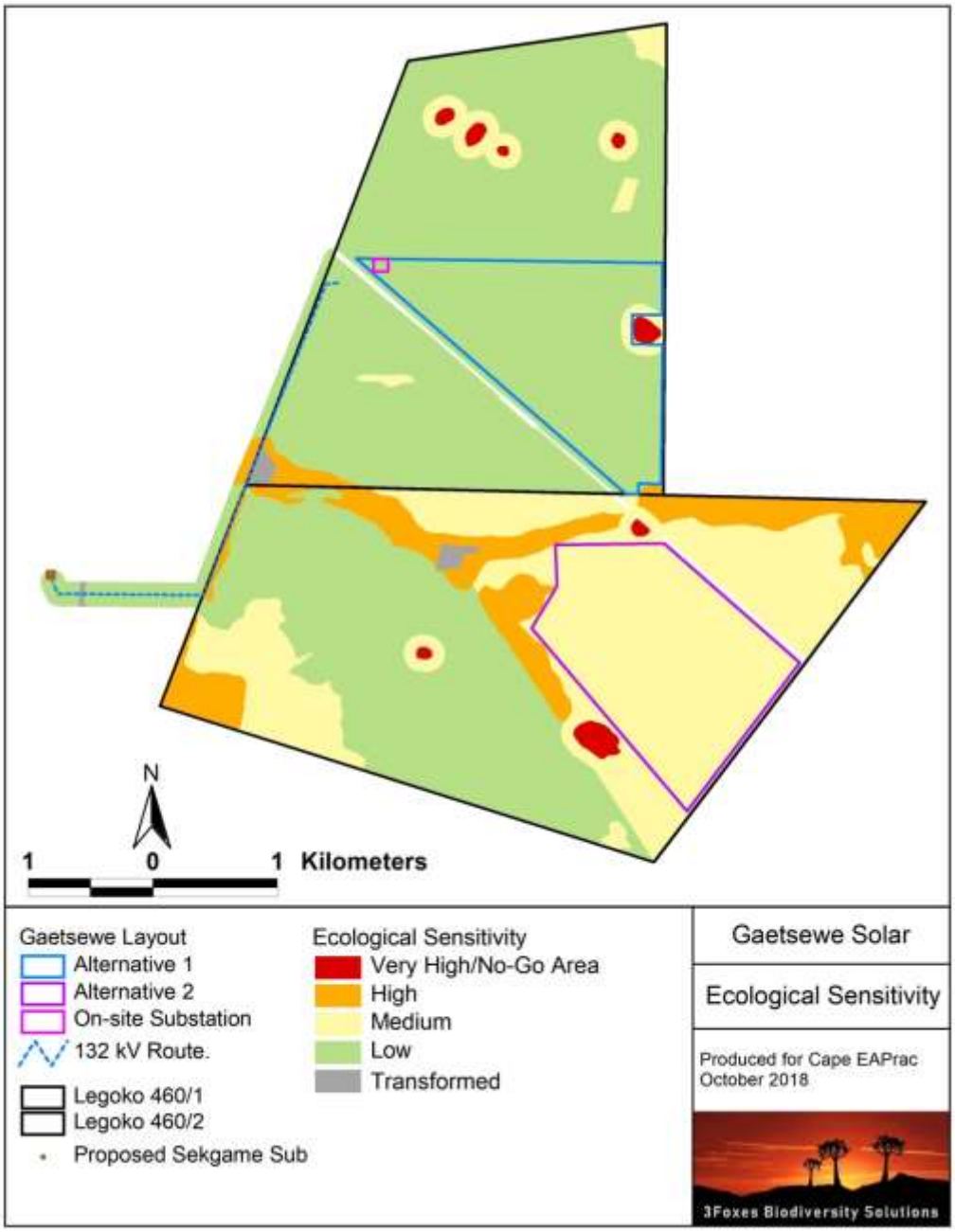

Figure 13. Sensitivity map for the Gaetsewe Solar project, showing the two alternatives and the grid connection.

5 IDENTIFICATION & NATURE OF IMPACTS

In this section, the impacts and associated risk factors that may be generated by the 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

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.

5.1 IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES

5.2 IDENTIFICATION OF IMPACTS TO BE ASSESSED

Potential ecological impacts resulting from the development of the Gaetsewe Solar energy facility 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 site which may be impacted by the development, most notably *Acacia erioloba* and *A.haematoxylon*. Vegetation clearing during construction will lead to the loss of currently intact habitat within the development footprint and is an inevitable consequence of the 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.

Reduced ability to meet conservation obligations & targets

The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the country's ability to meet its conservation targets. Although the receiving vegetation type in the study area is classified as Least Threatened and is still more than 98% intact, it is a relatively restricted vegetation type for an arid area and is therefore vulnerable to cumulative impact. This impact is therefore assessed in light of the current development as well as any other developments in the surrounding area which would also contribute to cumulative impacts.

Impact on broad-scale ecological processes

Transformation of intact habitat 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, habitat transformation is a potential cumulative impact of the development that is assessed.

6 ASSESSMENT OF IMPACTS

The various identified impacts are assessed below for the different phases of the development, first for the PV facility and then for the grid connection. It is important to note that the assessment is based on the layout as provided and any changes to the layout may invalidate the assessment.

6.1 GAETSEWE SOLAR PV DEVELOPMENT

The following is an assessment of the Gaetsewe Solar facility, for the planning and construction and operational phase of the development.

6.1.1 Planning & Construction Phase

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

Nature of impact	**Impacts on vegetation and listed or protected plant species resulting from construction activities**							
Alternative	**Spatial Extent**	**Duration**	**Intensity**	**Probability**	**Reversibility**	**Significance and Status**		**Confidence level**
						Without Mitigation	**With Mitigation**	
Alternative 1	Local	Long-Term	Medium	Definite	Low	Medium Negative	Low Negative	High
Alternative 2	Local	Long-Term	High	Definite	Low	High Negative	Medium Negative	High

Mitigation/Management Actions

- Preconstruction walk-through of the facility in order to locate species of conservation concern that can be translocated (such as aloes) as well as comply with the Northern Cape Nature Conservation Act and DENC/DAFF permit conditions.
- Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- Preconstruction 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, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- Environmental Control Officer (ECO) 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 lay-down 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.

Impact 2. Direct Faunal Impacts Due to Construction Activities

Nature of impact	**Direct Faunal Impacts During Construction**							
Alternative	**Spatial Extent**	**Duration**	**Intensity**	**Probability**	**Reversibility**	**Significance and Status**		**Confidence level**
						Without Mitigation	**With Mitigation**	
Alternative 1	Local	Short- Term	Medium	High	High	Medium	Medium-Low Negative	High
Alternative 2	Local	Short- Term	Medium	High	High	Medium Negative	Medium-Low Negative	High

Mitigation/Management Actions

- 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 the ECO or appropriately qualified environmental officer.
- All construction 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. 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 water pipelines or electrical cabling, 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.

6.1.2 Operational Phase Impacts

Impact 1. Faunal Impacts due to Operation

Nature of Impact	**Faunal Impacts due to operational activities**							
Alternative	**Spatial Extent**	**Duration**	**Intensity**	**Probability**	**Reversibility**	**Significance and Status**		Confidence level
						Without Mitigation	**With Mitigation**	
Alternative 1	Local	Long-term	Medium-Low	Moderate	High	Medium-Low Negative	Low-Negative	High
Alternative 2	Local	Long-term	Medium-Low	Moderate	High	Medium-Low Negative	Low-Negative	High

Mitigation/Management Actions

- 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) 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.

6.2 GAETSEWE SOLAR GRID CONNECTION

The following is an assessment of the grid connection for the Gaetsewe Solar facility, for the planning and construction and operational phases of the development.

6.2.1 Planning & Construction Phase

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

Impact Nature	Impacts on vegetation and listed or protected plant species resulting from power line construction activities						
Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Significance and Status	Confidence level
						Without Mitigation / With Mitigation	
Alternative 1	Local	Long-Term	Moderate	High	Low	Medium-Low Negative / Low Negative	High
Alternative 2	Local	Long-Term	Moderate	High	Low	Medium-Low Negative / Low Negative	High

Mitigation/Management Actions

- Preconstruction walk-through of the power line route 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/DAFF permit conditions.
- Construction and vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- No large woody species should be unnecessarily cleared from the power line servitude. It may be necessary to remove some individuals from the directly beneath the power line due to safety and operational concerns, however, within the servitude the presence of large woody species does not increase the fire risk and there are no valid reasons to remove such trees. If these are too tall and cause safety problems, they can be cut to a lower height rather than removed and as growth rate in arid areas is slow. It would take many years before such trees would need to be trimmed again. Such trees can be trimmed to 1m height if necessary although this would almost certainly result in the mortality of large *Acacia erioloba* individuals. DAFF has a guideline available for tree clearing and trimming within power line servitudes which should serve as a guide.
- Preconstruction environmental induction for all construction staff to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- Vegetation clearing along the power line corridor should only be conducted where necessary and should not be cleared using herbicides or with a bulldozer. Vegetation can be cleared manually with bush cutters to 0.5m height where necessary.
- Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity.

Impact 2. Faunal Impacts due to power line construction activities.

Impact Nature	**Direct Faunal Impacts During Construction**						
Alternative	**Spatial Extent**	**Duration**	**Intensity**	**Probability**	**Reversibility**	**Significance and Status**	**Confidence level**
						Without Mitigation / **With Mitigation**	
Alternative 1	Local	Short- Term	Medium-Low	High	High	Medium-Low Negative / Low Negative	High

Mitigation/Management Actions

- 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 the ECO or appropriately qualified environmental officer.
- All construction 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. 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 holes or trenches need to be dug, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Holes should only be dug when they are required and should be used and filled shortly thereafter.

6.3 CUMULATIVE IMPACTS

The following are the cumulative impacts that are assessed as being a likely consequence of the development of the Gaetsewe Solar PV facility. These are 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 and other activities in the area.

Cumulative Impact 1. Reduced ability to meet conservation obligations & targets due to cumulative habitat loss

Nature of impact	**Reduced ability to meet conservation obligations & targets due to cumulative habitat loss**							
Alternative	**Spatial Extent**	**Duration**	**Intensity**	**Probability**	**Reversibility**	**Significance and Status**		**Confidence level**
						Without Mitigation	**With Mitigation**	
Alternative 1	Regional	Long-Term	Low	Low	Moderate	Low Negative	Low Negative	Moderate-High
Alternative 2	Regional	Long-Term	Medium-Low	Moderate	Moderate	Medium Low Negative	Medium Low Negative	Moderate-High
Mitigation/Management Actions • The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. • An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.								

Cumulative Impact 2. Impact on broad-scale ecological processes due to cumulative loss and fragmentation of habitat

Nature of Impact	**Impact on broad-scale ecological processes due to cumulative loss and fragmentation of habitat**							
Alternative	**Spatial Extent**	**Duration**	**Intensity**	**Probability**	**Reversibility**	**Significance and Status**		**Confidence level**
						Without Mitigation	**With Mitigation**	
Alternative 1	Regional	Long-Term	Medium	Moderate	Low	Medium-Low Negative	Low Negative	Moderate-High
Alternative 2	Regional	Long-Term	Medium	Moderate	Low	Medium-Low Negative	Medium Low Negative	Moderate-High

Mitigation/Management Actions

- Minimise the development footprint as far as possible. A cover of indigenous grasses should be encouraged and maintained within the facility. This prevents the invasion of weeds and is the easiest to manage in the long-term. Furthermore, the grasses can be maintained low through livestock (sheep) grazing which is being successfully used at existing PV facilities.
- The facility should be fenced off in a manner which allows small fauna to pass through the facility. In practical terms this means that the facility should be fenced-off to include only the developed areas and should include as little undeveloped ground or natural veld as possible. In addition, there should not be electrified ground-strands present within 30cm of the ground and the electrified strands should be located on the inside of the fence and not the outside. Furthermore, the fence should be a single layer fence and not a double fence with a large gap between. Images of suitable fencing types from existing PV facilities are available on request.

7 CONCLUSION & RECOMMENDATIONS

The vegetation of the preferred Alternative 1 consists largely of degraded *Tachonanthus camphoratus* scrub, with few species or features of concern present across most of the site. Impacts on fauna and flora associated with the development of this alternative are likely to be low and no high post-mitigation impacts are likely. The Alternative 2 option occurs within good condition rangeland with a high abundance of *Acacia erioloba* and *Acacia haematoxylon*. This is the less-preferred alternative from an ecological perspective and would generate significantly higher impacts on fauna, flora and ecological processes than the preferred alternative.

Impacts associated with the development of the site would be largely restricted to the construction phase when vegetation clearing and construction activities would take place. This would result in some habitat loss and disturbance for resident fauna, with consequences restricted to the local area only. The small pan along the eastern margin of the PV area has been excluded from the footprint, but it is further recommended that the pan is not 'boxed in' and that the development area is shaped more gradually away from this feature to better maintain connectivity of the pan with the surrounding landscape. The abundance of habitats and plant species of conservation concern in the development footprint is relatively low and there would be no impacts on fauna and flora which would be of wider significance. The grid connection for the development is relatively short and while it would likely require the clearing of some *Acacia erioloba* trees, the overall footprint and impact of the grid connection would be low and would generate low impacts on fauna and flora.

Cumulative impacts in the area are a concern due firstly to the mining activity that characterises the area and secondly due to the proliferation of solar energy development in the Kathu area. In terms of habitat loss, the affected Kathu Bushveld vegetation type is still over 90% intact and while this is not a very extensive vegetation type, the loss of 212ha of degraded habitat is not considered highly significant, especially given the spatial context of the site. In terms of potential losses to landscape connectivity, the location and ecological context of the site indicates that it does not lie within an area that is considered a likely faunal movement corridor or along an important ecological gradient. As such, the overall cumulative impact of the development is considered likely to be low.

Impact Statement

The development footprint of the Alternative 1 Gaetsewe Solar PV facility is restricted largely to low sensitivity habitat within the site. The affected area is considered suitable for development and there are no impacts associated with the Gaetsewe Solar PV Facility that cannot be mitigated to a low level. As such there are no fatal flaws or high post-mitigation

impacts that should prevent the development from proceeding. Based on the layout provided for the assessment, the Gaetsewe Solar PV facility can be supported from a terrestrial ecology point of view. The Gaetsewe grid connection with associated infrastructure is likely to generate low impacts on fauna and flora after mitigation. No high impacts that cannot be avoided were observed and from a flora and terrestrial fauna perspective, there are no reasons to oppose the development of the grid connections and associated infrastructure.

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9 ANNEX 1. LIST OF PLANT SPECIES

List of plant species confirmed present at the Gaetsewe site during the course of the field assessment.

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	*Acacia hebeclada*	LC
FABACEAE	*Acacia erioloba*	LC
FABACEAE	*Acacia haematoxylon*	LC
FABACEAE	*Acacia karroo*	LC
FABACEAE	*Acacia 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

10 ANNEX 2. LIST OF MAMMALS

List of mammals which have been observed or which are likely to occur in the vicinity of the Gaetsewe site. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from 2016 EWT/SANBI Red List. Confirmed species are those observed in the area, not necessarily from the site itself.

Scientific Name	Common Name	Status	Habitat	Likelihood
Macroscledidea (Elephant Shrews):				
Macroscelides proboscideus	Round-eared Elephant Shrew	LC	Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover	High
Elephantulus rupestris	Western Rock Elephant Shrew	LC	Rocky koppies, rocky outcrops or piles of boulders where these offer sufficient holes and crannies for refuge.	High
Tubulentata:				
Orycteropus afer	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	Confirmed
Hyracoidea (Hyraxes)				
Procavia capensis	Rock Hyrax	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies	Confirmed
Lagomorpha (Hares and Rabbits):				
Lepus capensis	Cape Hare	LC	Dry, open regions, with palatable bush and grass	Confirmed
Lepus saxatilis	Scrub Hare	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	High
Rodentia (Rodents):				
Cryptomys hottentotus	African Mole Rat	LC	Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils	Confirmed
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	Confirmed
Pedetes capensis	Springhare	LC	Occur widely on open sandy ground or sandy scrub, on overgrazed grassland, on the fringes of vleis and dry river beds.	Confirmed
Xerus inauris	South African Ground Squirrel	LC	Open terrain with a sparse bush cover and a hard substrate	Confirmed
Graphiurus ocularis	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	High
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
Mus minutoides	Pygmy Mouse	LC	Wide habitat tolerance	High
Mastomys coucha	Southern Multimammate Mouse	LC	Wide habitat tolerance.	Confirmed

Aethomys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these preferentially	Confirmed
Parotomys brantsii	Brants' Whistling Rat	LC	Associated with a dry sandy substrate in more arid parts of the Nama-karoo and Succulent Karoo. Species selects areas of low percentage of plant cover and areas with deep sands.	High
Parotomys littledalei	Littledale's Whistling Rat	LC	Riverine associations or associated with Lycium bushes or Psilocaulon absimile	High
Otomys unisulcatus	Bush Vlei Rat	LC	Shrub and fynbos associations in areas with rocky outcrops Tend to avoid damp situations but exploit the semi-arid Karoo through behavioural adaptation.	Low
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush	High
Gerbillurus paeba	Hairy-footed Gerbil	LC	Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover	Confirmed
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	Confirmed
Gerbilliscus brantsii	Higheld Gerbil	LC	Sandy soils or sandy alluvium with some cover of grass, scrub or open woodland	Low
Malacothrix typica	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
Primates:				
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	High
Eulipotyphla (Shrews):				
Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
Erinaceomorpha (Hedgehog)				
Atelerix frontalis	South African Hedgehog	VU	Generally found in semi-arid and subtemperate environments with ample ground cover	Low
Carnivora:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	High
Caracal caracal	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	High
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	Confirmed
Felis nigripes	Black-footed cat	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub.	High
Genetta genetta	Small-spotted genet	LC	Occur in open arid associations	High
Suricata suricatta	Meerkat	LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	High

Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Confirmed
Herpestes pulverulentus	Cape Grey Mongoose	LC	Wide habitat tolerance	High
Vulpes chama	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	High
Canis mesomelas	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	Confirmed
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	Confirmed
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	Confirmed
Mellivora capensis	Ratel/Honey Badger	LC	Catholic habitat requirements	High
Rumanantia (Antelope):				
Oryx gazella	Gemsbok	LC	Open arid country	Confirmed
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	Confirmed
Antidorcas marsupialis	Springbok	LC	Arid regions and open grassland.	Confirmed
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Confirmed

11 ANNEX 2. LIST OF REPTILES

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

Family	Genus	Species	Subspecies	Common name	Red list category	No. records
Agamidae	***Agama***	***aculeata***	***aculeata***	**Common Ground Agama**	**Least Concern**	**4**
Agamidae	*Agama*	*anchietae*		Anchieta's Agama	Least Concern	5
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Least Concern	3
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Least Concern	1
Colubridae	*Psammophis*	*namibensis*		Namib Sand Snake	Least Concern	1
Colubridae	*Psammophis*	*notostictus*		Karoo Sand Snake	Least Concern	3
Colubridae	*Telescopus*	*beetzii*		Beetz's Tiger Snake	Least Concern	2
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern	3
Gekkonidae	*Chondrodactylus*	*angulifer*	*angulifer*	Common Giant Ground Gecko	Least Concern	5
Gekkonidae	*Chondrodactylus*	*bibronii*		Bibron's Gecko	Least Concern	14
Gekkonidae	***Pachydactylus***	***capensis***		**Cape Gecko**	**Least Concern**	**4**
Gekkonidae	*Pachydactylus*	*latirostris*		Quartz Gecko	Least Concern	6
Gekkonidae	*Pachydactylus*	*rugosus*		Common Rough Gecko	Least Concern	5
Gekkonidae	*Ptenopus*	*garrulus*	*maculatus*	Spotted Barking Gecko	Least Concern	6
Lacertidae	*Heliobolus*	*lugubris*		Bushveld Lizard	Least Concern	1
Lacertidae	*Nucras*	*tessellata*		Western Sandveld Lizard	Least Concern	1
Lacertidae	*Pedioplanis*	*inornata*		Plain Sand Lizard	Least Concern	3
Lacertidae	*Pedioplanis*	*lineoocellata*	*lineoocellata*	Spotted Sand Lizard	Least Concern	39
Lacertidae	***Pedioplanis***	***namaquensis***		**Namaqua Sand Lizard**	**Least Concern**	**9**
Scincidae	*Acontias*	*lineatus*		Striped Dwarf Legless Skink	Least Concern	1
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern	2
Scincidae	*Trachylepis*	*occidentalis*		Western Three-striped Skink	Least Concern	6
Scincidae	*Trachylepis*	*sparsa*		Karasburg Tree Skink	Least Concern	1
Scincidae	*Trachylepis*	*spilogaster*		Kalahari Tree Skink	Least Concern	2
Scincidae	*Trachylepis*	*sulcata*	*sulcata*	Western Rock Skink	Least Concern	6
Scincidae	***Trachylepis***	***variegata***		**Variegated Skink**	**Least Concern**	**17**
Testudinidae	*Psammobates*	*tentorius*	*verroxii*	Verrox's Tent Tortoise	Not listed	12
Testudinidae	*Stigmochelys*	*pardalis*		Leopard Tortoise	Least Concern	1
Typhlopidae	*Rhinotyphlops*	*lalandei*		Delalande's Beaked	Least Concern	1

				Blind Snake		
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern	1

12 ANNEX 3. LIST OF AMPHIBIANS

List of amphibians which are likely to occur in the vicinity of the Gaetsewe 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	Near Threatened
Pyxicephalidae	*Tomopterna*	*cryptotis*	Tremelo Sand Frog	Least Concern