ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED ALLEPAD THREE SOLAR PV FACILITY AND ASSOCIATED INFRASTRUCTURE, UPINGTON, NORTHERN CAPE:

FAUNA & FLORA SPECIALIST SCOPING REPORT

savannah environmental

PRODUCED FOR SAVANNAH ENVIRONMENTAL

BY

3Foxes Biodiversity Solutions

Simon.Todd@3foxes.co.za

September 2018

EXECUTIVE SUMMARY

ILEnergy Development (Pty) Ltd are proposing the establishment of the 100MW Allepad PV Three commercial photovoltaic solar energy facilities on a portion of the Remaining Extent of Erf 5315, located approximately 11km north-west of Upington, in the Dawid Kruiper Local Municipality, of the ZF Mgcawu District, in the Northern Cape Province. The development is currently in the Scoping Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity scoping study of the development site as part of the EIA process.

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 vegetation of the site consists of Kalahari Karroid Shrubland in the east and Gordonia Duneveld in the west of the site. The areas of Kalahari Karroid Shrubland in the east are associated with shallow calcrete soils and have numerous drainage lines as well as a few small pans present. This area is considered largely unsuitable for development. The western half of the site on undulating sandy soils is considered to be low sensitivity and suitable for development apart from the extensive area of mobile dunes which is considered to be medium-high sensitivity and not suitable for development as the loose sands are very vulnerable to erosion. In terms of fauna, there are few species of conservation concern that are likely to be present or abundant at the site. The primary impact of the development on fauna would be 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 development.

Cumulative impacts in the area are a potential concern due to the proliferation of solar energy development in the wider Upington area. In terms of habitat loss, the Gordonia Duneveld vegetation type is still approximately 99% intact and is also a very extensive vegetation type, with the result that the loss of habitat associated with the development is not considered highly significant given that there are still very large contiguous intact areas available north of the site. However, there may still be significant local impacts on habitat fragmentation that will require investigation in the EIA phase.

At this stage of the Scoping process there are no impacts associated with the development that are considered to be of high significance and which cannot be mitigated to an acceptable level. Therefore, based on the results of this assessment, there are no reasons to indicate that the development should not move into the EIA phase for further assessment. A proposed plan of study for the EIA phase is provided.

CONTENTS

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

- Bloemsmond Solar 1 and Solar 2. Fauna and Flora EIA Process. Savannah Environmental 2015.
- Karoshoek CSP Development. Fauna and Flora EIA Process. Savannah Environmental 2016.
- Rooipunt 132kV Line, Upington. Fauna and Flora BA study. SiVest 2016.
- Dyason's Klip Solar PV Facility, Upington. Fauna and Flora EIA Proces. Cape EAPrac 2015.
- RE Capital 11 Solar PV Facility, Upington. Fauna and Flora EIA Proces. Cape EAPrac 2015.
- Joram Solar Plant, Upington. Fauna and Flora EIA Proces. Cape EAPrac 2015.
- Adams PV Project – EIA process and follow-up vegetation survey. Aurora Power Solutions. 2016.
- Solis 2 CSP Facility, van Roois Vley, Upington. Flora EIA process. WSP. 2014.

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: ____28 September 2018_____

1 INTRODUCTION

ILEnergy Development (Pty) Ltd are proposing the establishment of the 100MW Allepad PV Three commercial photovoltaic solar energy facilities on a portion of the Remaining Extent of Erf 5315, located approximately 11km north-west of Upington, in the Dawid Kruiper Local Municipality, of the ZF Mgcawu District, in the Northern Cape Province. Savannah Environmental has been appointed to undertake the required application for environmental authorisation process for the above development. The development is currently in the Scoping Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity (fauna and flora) scoping study of the development site as part of the EIA process.

The purpose of the Allepad PV Three Terrestrial Biodiversity Scoping Report is to describe and detail the ecological features of the proposed PV project site, provide a preliminary assessment of the ecological sensitivity of the site, and identify the likely impacts that may be associated with the development of the site as a solar PV facility. 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. This information is used to derive a draft ecological sensitivity map that presents the ecological constraints and opportunities for development at the site. The information and sensitivity map presented herein provides an ecological baseline that should be used in the planning phase of the development to ensure that the potential negative ecological impacts associated with the development can be minimised. Furthermore, the study defines the terms of reference for the EIA phase of the project and outlines a plan of study for the EIA which will follow the Scoping Study. The full scope of study is detailed below.

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
- Decommissioning

1.1 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), as well as best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers et al. (2005).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:

- 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.

1.2 RELEVANT ASPECTS OF THE DEVELOPMENT

The project is proposed on a portion of the Remaining Extent of Erf 5315, located approximately 11km north-west of Upington. The area under investigation is approximately

3 889ha in extent and comprises a single agricultural property. The project site can be accessed directly via the N10 national road which borders the southern boundary of the site. (**Figure 1**). Photovoltaic (PV) technology is proposed for the generation of electricity. The solar energy facility will have a contracted capacity of up to 100MW, and will make use of either fixed-tilt, single-axis tracking, or dual-axis (double axis) tracking PV technology. The solar energy facility will comprise the following key infrastructure components:

- Arrays of PV panels with a generation capacity of up to 100MW.
- Mounting structures to support the PV panels.
- Combiner boxes, on-site inverters (to convert the power from Direct Current (DC) to Alternating Current (AC)), and power transformers.
- A 132kV on-site substation up to 1ha in extent to facilitate the connection between the solar energy facility and the Eskom electricity grid.
- A new 132kV power line approximately 5km in length, between the on-site substation and Eskom grid connection point.
- Cabling between the project's components (to be laid underground where practical).
- Meteorological measurement station.
- Energy storage area of up to 2ha in extent.
- Access road and internal access road network.
- On-site buildings and structures, including a control building and office, ablutions and guard house.
- Perimeter security fencing, access gates and lighting.
- Temporary construction equipment camp up to 1ha in extent, including temporary site offices, parking and chemical ablution facilities.
- Temporary laydown area up to 1ha in extent, for the storage of materials during the construction.

Electricity generated by the project will feed into Eskom's national electricity grid via a new 132kV power line which will connect the on-site substation to the upgraded 132kV double circuit power line running between the new Upington Main Transmission Substation (MTS) (currently under construction approximately 15km south of the project site), and the Gordonia Distribution Substation (located in Upington town). The point of connection is located approximately 5km east of the project site, and will make use of a loop-in and loop-out configuration, utilising a double circuit mono-pole construction. The proposed power line required for the project will be constructed within a 36m wide servitude. A 300m wide power line corridor has been identified for investigation along the southern boundary of the site, running immediately north of, and parallel to, the N10 national road.

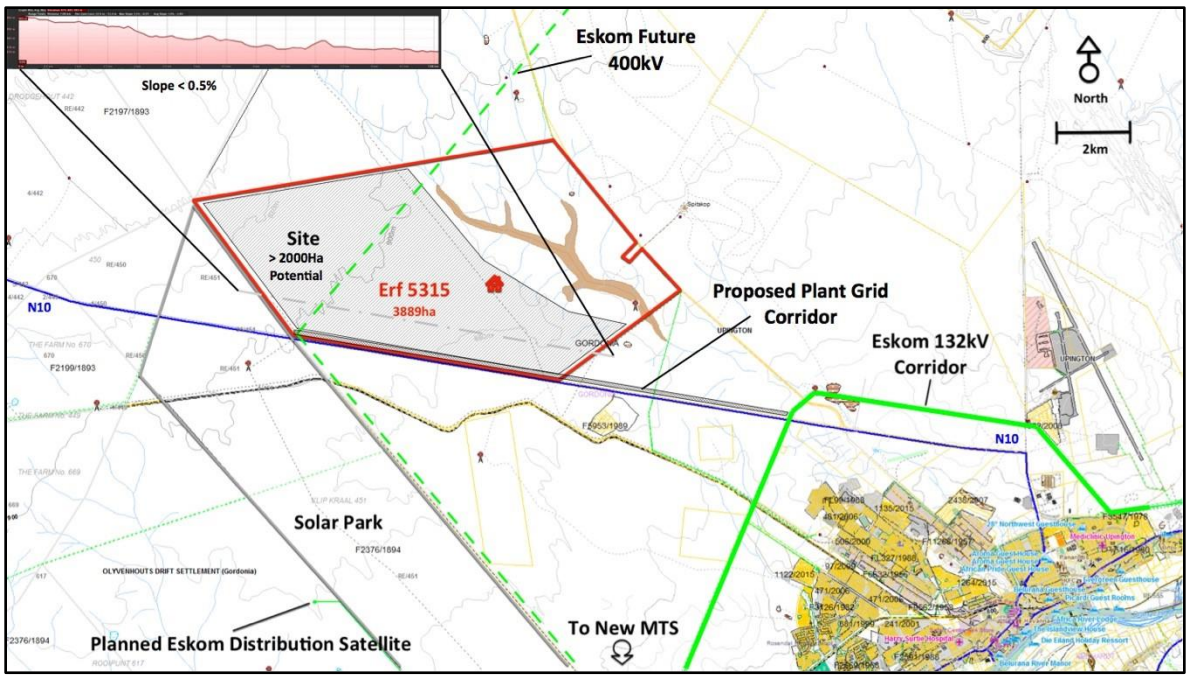

Figure 1. Locality map of the Allepad PV Three study site, illustrating the property boundary in red and the proposed power line route to the Eskom substation at Upington in grey.

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:

- **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** – 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.

In some situations, areas were also classified between the above categories, such as Medium-High, where it was deemed that an area did not fit well into a certain category but rather fell most appropriately **between** two sensitivity categories. **However, it is important to note that there are no sensitivities that are identified as "Medium to High" or similar ranged categories because this adds uncertainty to the mapping as it is not clear if an area falls at the bottom or top of such a range.**

2.3 SAMPLING LIMITATIONS AND ASSUMPTIONS

The current study is based largely on a desktop study augmented by information collected on site during the avifaunal survey. However, this is coarse habitat-level information and not detailed vegetation or faunal surveys. This presents some limitations for the study as features or species of concern may be present that are not observable from the satellite imagery of the site. As such, the sensitivity of parts of the site may be under or over-estimated. The consultant has extensive experience in the Upington area however, and is familiar with the study area, having worked on adjacent sites. Furthermore, a cautious approach to the sensitivity mapping has been followed, with areas of uncertainty being allocated sensitivity classes associated with a worst-case scenario.

In terms of the fauna lists for the area, there are some constraints associated with these as 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 site. This is acknowledged as a limitation of the study however it is substantially reduced by the previous 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), there are two vegetation types within the study area, Kalahari Karroid Shrubland in the east and Gordonia Duneveld in the west (Figure 2).

Both Kalahari Karroid Shrubland and Gordonia Duneveld are classified as Least Threatened and have been little impacted by transformation and more than 99% of their original extent is still intact. Kalahari Karroid Shrubland is considered Hardly Protected within formal conservation areas, while Gordonia Duneveld is Moderately Protected. No vegetation-type endemic species are listed for either Kalahari Karroid Shrubland or Gordonia Duneveld (Mucina & Rutherford 2006). The biogeographically important and endemic species known from these vegetation types tend to be widespread within the vegetation type itself and local-level impacts are not likely to be of significance for any of these vegetation types or species concerned. Gordonia Duneveld is widely distributed and is among the most extensive vegetation types in South Africa while Kalahari Karroid Shrubland is less extensive, but represents a transitional vegetation type between the northern Nama Karoo and Kalahari (Savannah) vegetation types.

Species commonly observed within the areas of Kalahari Karroid Shrubland on nearby sites include shrubs such as *Leucosphaera bainesii*, *Hermannia spinosa*, *Monoechma genistifoilium*, *Salsola rabieana*, *Aptosimum albomarginatum*, *A.spinecens*, *Kleinia longiflora*, *Limeum argute-carinatum*, *Phyllanthus maderaspatensis*, *Zygophyllum dregeanum* and grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana* and *Schmidtia kalariensis*. The proportion of shrubs in this vegetation type is usually related to soil depth and texture, with the proportion of grass increasing as the soils become deeper or more sandy. Species of conservation concern that are often present include *Adenium oleifolium*, *Aloe claviflora* and *Hoodia gordonii*.

The areas of Gordonia Duneveld consists of several different habitats. The most obvious of which are the dunes and the inter-dune areas. The dunes and areas of deep sand are usually dominated by species such as *Crotalaria orientalis*, *Stipagrostis amabilis*, *Centropodia glauca*, *Acacia haematoxylon* and various forbs. The interdune slacks are usually dominated by grasses or *Rhigozum trichotomum* depending on the substrate conditions as well as the history of land use. Other common species associated with the areas of Gordonia Duneveld include trees such as *Parkinsonia africana*, *Boscia foetida*, *Boscia albitrunca* and *Acacia erioloba*, shrubs such as *Phaeoptilum spinosum*, *Rhigozum trichotomum*, and *Lycium bosciifolium*, grasses such as *Stipagrostis ciliata*, *S.uniplumis*, *S.amabilis*, *Schmidtia kalahariensis*, and forbs such as *Senna italica*, *Tribulis pterophorus*, *Hermannia tomentosa* and *Requienia sphaerosperma*. Species of conservation concern associated with this habitat

include the nationally protected trees *Acacia erioloba*, *Acacia haematoxylon* and *Boscia albitrunca*.

In terms of the current study site, the areas of Kalahari Karroid Shrubland in the east of the site are considered moderate sensitivity due to their higher diversity, and the potential presence of several species of conservation concern. The flatter areas of Gordonia Duneveld dominated by *Rhigozum trichotomum* are considered relatively low sensitivity, while the more extensive area of contiguous dunes in the west of the site, are considered to be medium high sensitivity due to the vulnerability of this habitat to disturbance.

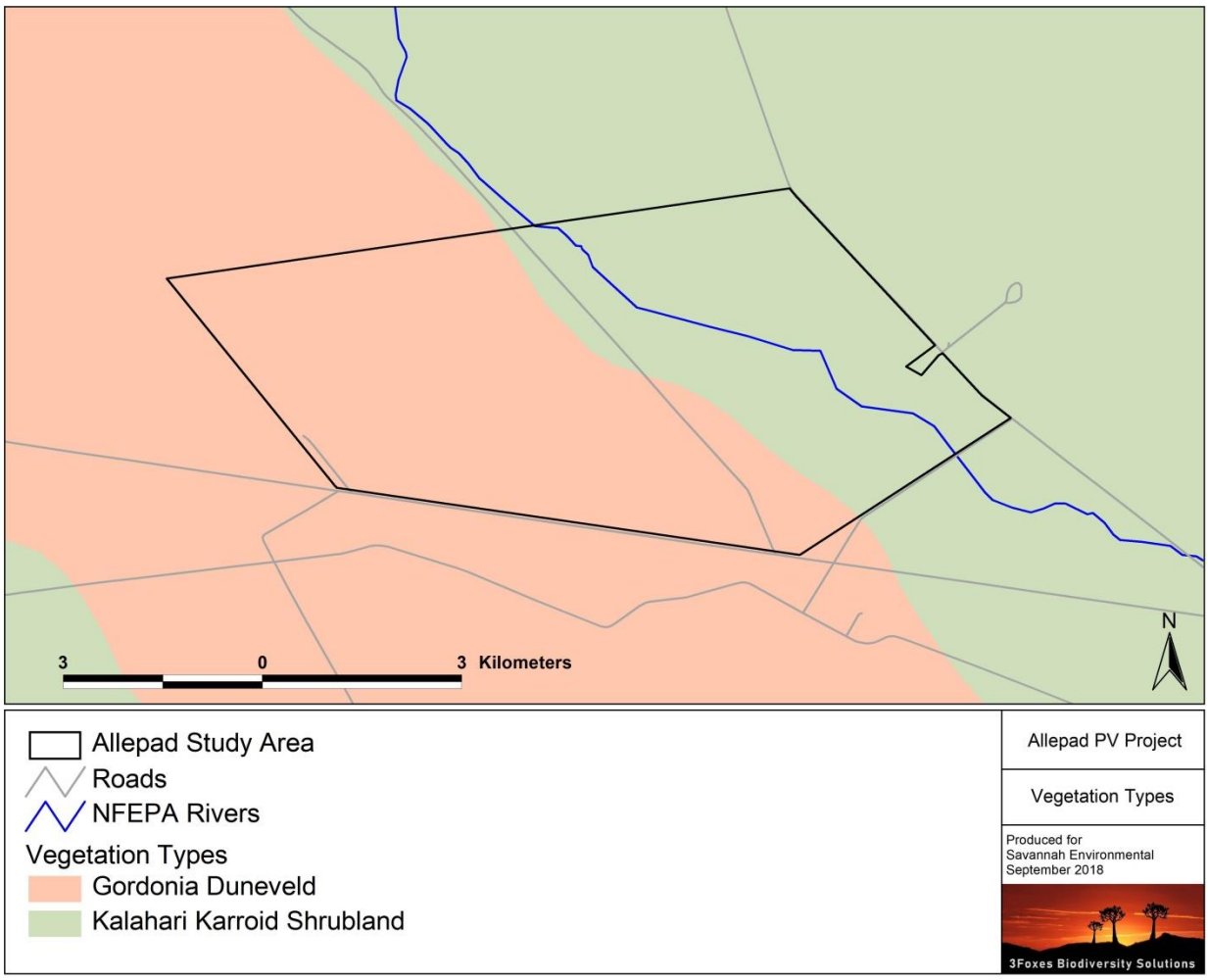

Figure 2. Broad-scale overview of the vegetation in and around the Allepad site. The vegetation map is an extract of the national vegetation map as produced by Mucina and Rutherford (2006/2012), and also includes drainage lines delineated by the NFEPA assessment (Nel et al. 2011).

3.2 LISTED AND PROTECTED PLANT SPECIES

Two NFA-protected tree species occur at the site *Acacia haematoxylon* and *Boscia albitrunca*. Both of these species are associated with the more active dune areas which are considered to be medium or medium high sensitivity. The provincially protected *Boscia foetida* subsp. *foetida* is also confirmed present at the site. It is also likely that Devils' Claw *Harpagophytum procumbens* is present at the site, within the dune areas as this species is relatively common on Gordonia Duneveld in the Upington area. The density and impact on these species will need to be confirmed in the EIA phase, once the layout of the PV facility has been determined.

3.3 FAUNAL COMMUNITIES

Mammals

The site falls within the distribution range of 46 terrestrial mammals, indicating that the mammalian diversity at the site is of moderate potential. The variety of habitats present at the site is however fairly low and the overall mammalian diversity at the site is likely to be lower than the richness of the broader area. The lack of rocky hills or outcrops at the site would preclude a variety of species from the site. Mammal species that can be confirmed present in the immediate area include Black-backed Jackal, African Wildcat, Cape Fox, South African Ground Squirrel, Steenbok, Cape Porcupine, Yellow Mongoose, Cape Hare and Aardvark.

Two listed terrestrial mammals may occur at the site, the Brown Hyaena *Hyaena brunnea* (Near Threatened) and Black-footed cat *Felis nigripes* (Vulnerable). While it is possible that both species occur at the site, it is least likely that the Brown Hyaena *Hyaena brunnea* is present as this species is often purposely or inadvertently persecuted within farming areas. As these two species have a wide national distribution, the development would not create a significant extent of habitat loss for these species.

Overall there do not appear to be any highly significant issues regarding mammals and the development of the site. In general, the major impact associated with the development of the site for mammals would be habitat loss and the disruption of the broad-scale connectivity of the landscape.

Reptiles

According to the SARCA database, 39 reptile species are known from the area suggesting that the reptile diversity within the site is likely to be moderate to low. As there are no significant rocky outcrops at the site, only species associated with sandy substrates or trees are likely to be present. Species observed in the vicinity include the Namaqua Mountain Gecko *Pachydactylus montanus*, Ground Agama *Agama aculeata aculeata*, Spotted Sand Lizard *Pedioplanis lineoocellata* and Spotted Desert Lizard *Meroles suborbitalis*. No reptile species of conservation concern are known from the area and there do not appear to be any broad

habitats at the site which would be of high significance for reptiles. As with mammals, the development is likely to result in local habitat loss for reptiles but as there are no listed or range-restricted reptiles that are likely to occur at the site the impacts are not likely to be of broader significance.

Amphibians

The site lies within the distribution range of 10 amphibian species. The only listed species which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. Although there are several small pans at the site which are likely to be used by other frogs, they are rock pans or too shallow for the Giant Bullfrog and it is not likely that this species is present at the site. As there are no natural perennial water sources at the site, it is likely that amphibian abundance is generally low and restricted largely to those species which are relatively independent of water such as the Karoo Toad *Vandijkophrynus gariepensis*. Overall, given the low likely abundance of amphibians at the site, impacts on amphibians are likely to be local in extent and of low significance.

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 3. The majority of the site lies within an area classified as "Other natural areas" and is not classified as a CBA or ESA. The drainage line which traverses the site is however classified as an ESA and would potentially be impacted by the development. 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.

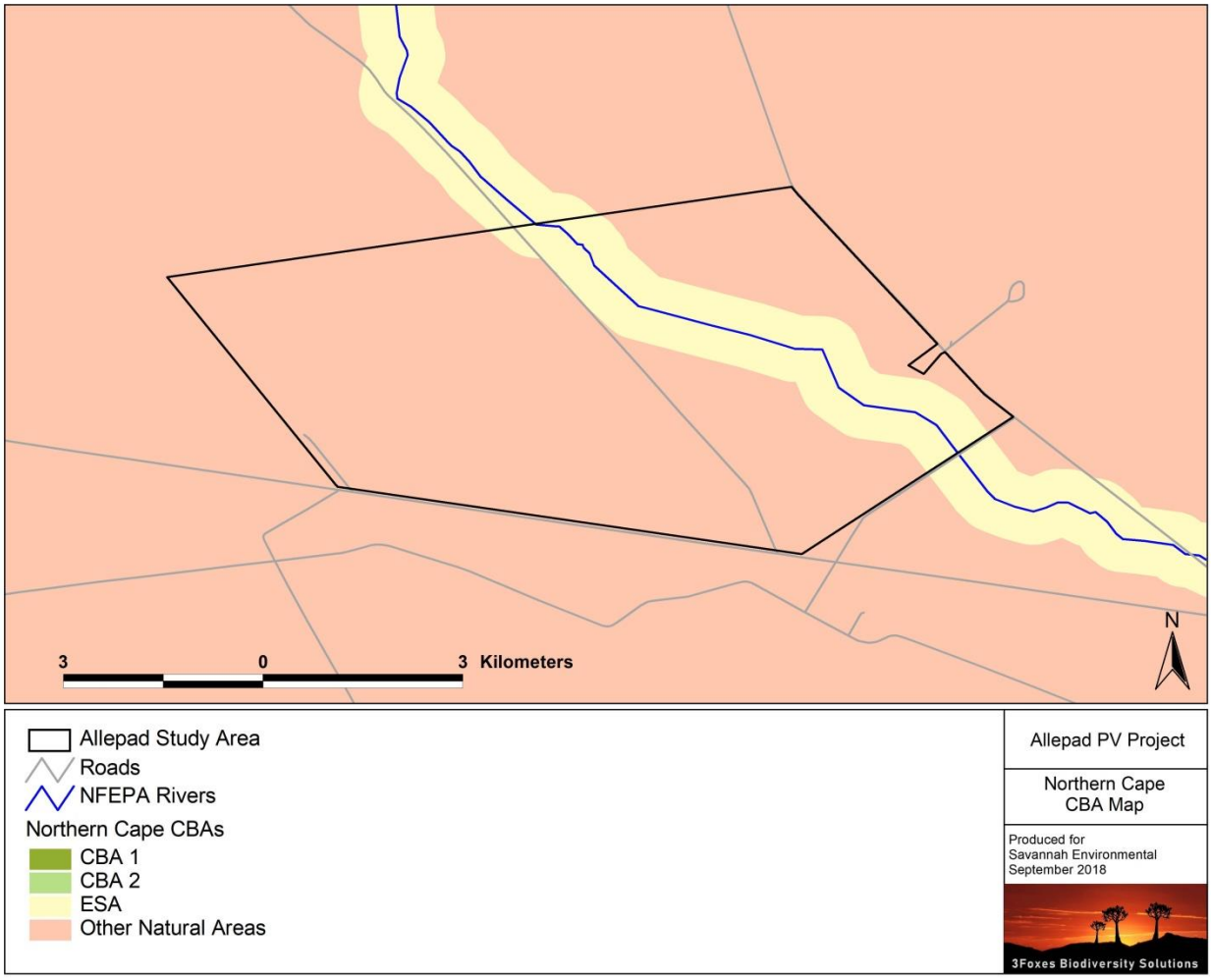

Figure 3. Extract of the Northern Cape Critical Biodiversity Areas map for the study area, showing that there are no CBAs in close proximity to the site.

3.5 CURRENT BASELINE & CUMULATIVE IMPACT

There is a large amount of renewable energy development in the Upington area, concentrated along the N14 and south of the Orange River (Figure 4). The Allepad PV Three project would potentially contribute to additional habitat loss and fragmentation in the area. The significance of this impact would need to be evaluated in the EIA phase, once the final footprint area and project extent has been finalised. In terms of the site itself, the drainage system which characterises the eastern section of the site, is likely to be the most important in terms of connectivity and faunal movement and is not likely to be impacted by the development.

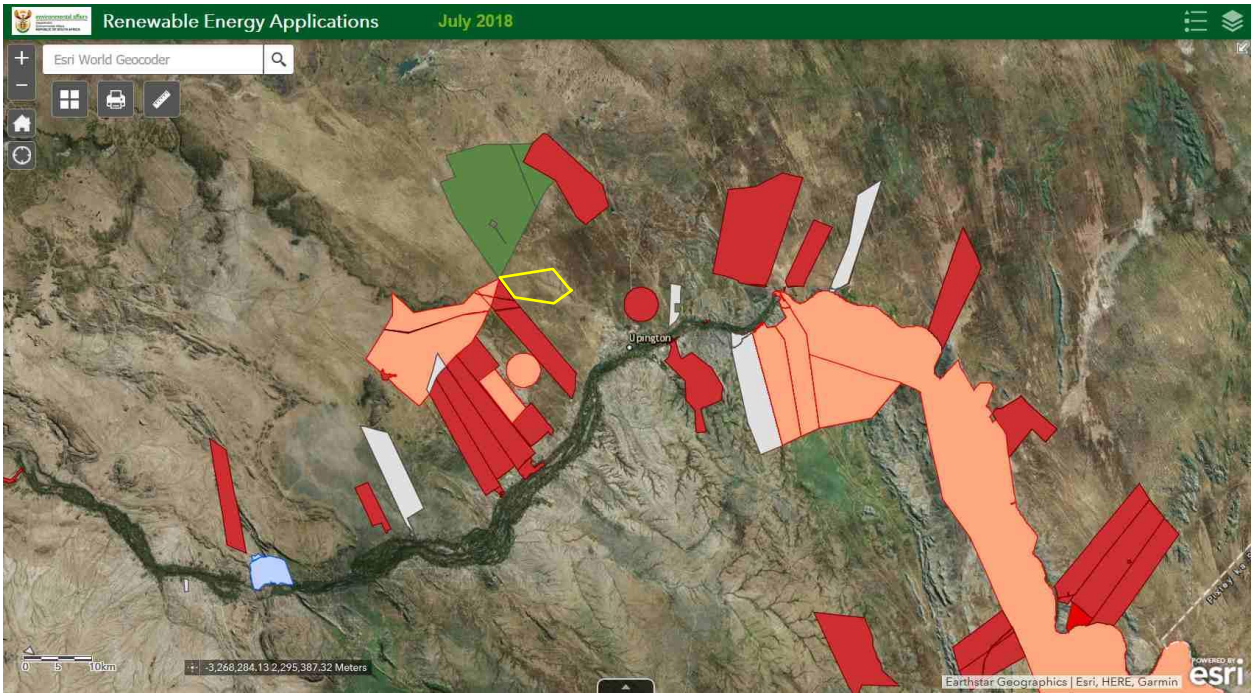

Figure 4. Map of DEA registered renewable energy applications as at July 2018, showing the Allepad site in yellow.

3.6 SITE SENSITIVITY ASSESSMENT

The sensitivity map for the Allepad study area is illustrated below in Figure 5. The eastern half of the site occurs on shallow calcrete soils and has numerous drainage lines as well as a few small pans present. This area is considered largely unsuitable for development. The western half of the site on undulating sandy soils is considered to be low sensitivity and suitable for development (Figure 6) apart from the extensive area of mobile dunes which is considered to be medium high sensitivity and not suitable for development as the loose sands are very vulnerable to erosion (Figure 7). In addition, it is likely that significant soil disturbance would be required in this area as the dunes would likely need to be at least partly levelled before construction. Based on these results, it is likely that the Allepad PV Three site can be located within area of low sensitivity where ecological impacts can be restricted to a low level. The power line corridor runs along the southern boundary of the site towards Upington and then runs adjacent to the N10 national road until it reaches upgraded 132kV between the Upington Main Transmission Substation (MTS) and the Gordonia Distribution Substation. The route was inspected and there are no visible features of high significance along the proposed route and minor features such as the occasional stands of trees present can likely be avoided though adjustment of the final route within the 300m corridor to be assessed.

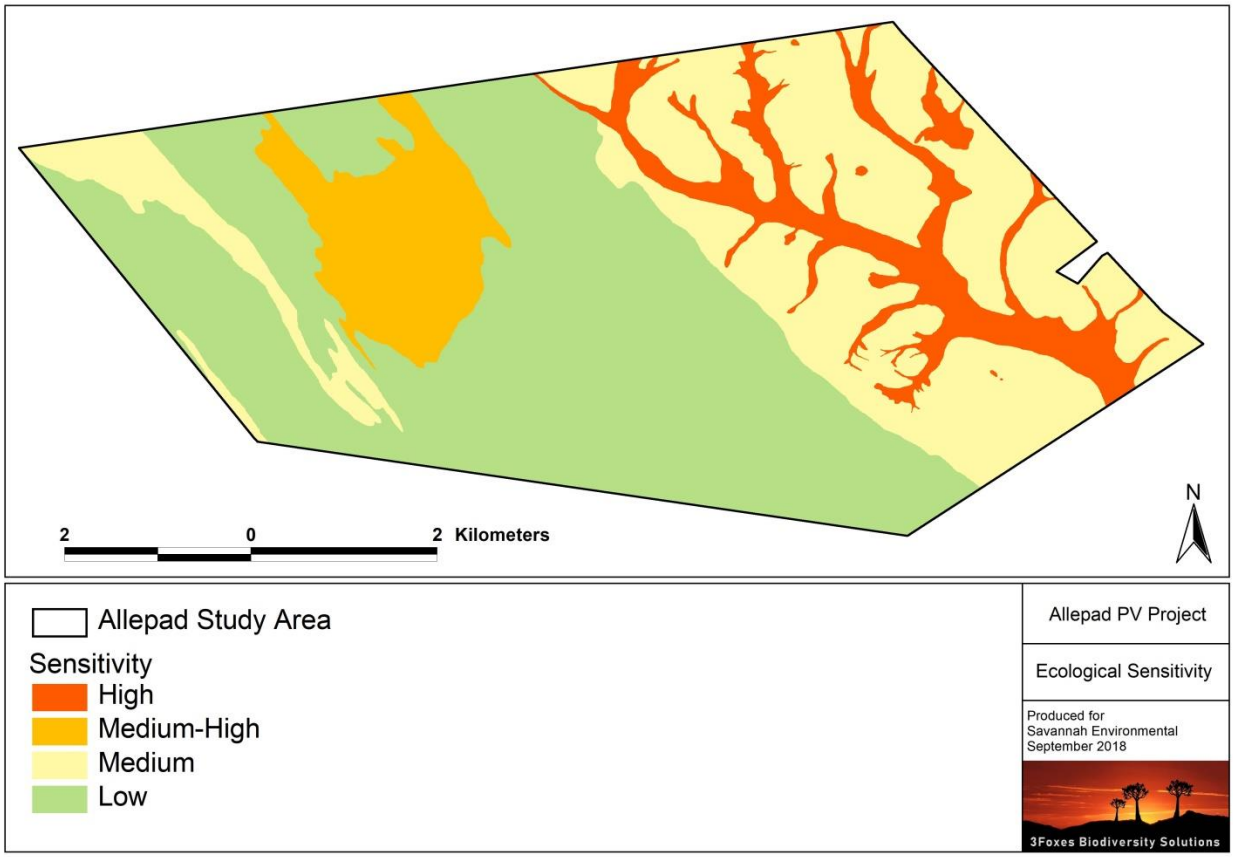

Figure 5. Sensitivity map for the Allepad PV Three project area.

Figure 6. The sandy plains of the site are considered to be relatively low sensitivity and broadly suitable for development.

Figure 7. The linear dunes of the site are considered more sensitive than the plains and are vulnerable to disturbance, especially wind erosion and the larger contiguous areas of dune field are considered unsuitable for development.

4 IDENTIFICATION & NATURE OF IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the development are identified and discussed before a preliminary Scoping-Level assessment is provided in the next section.

4.1 IDENTIFICATION OF IMPACTS TO BE ASSESSED

In this section the potential impacts associated with the development are explored in context of the features and characteristics of the site and the likelihood that each impact would occur given the characteristics of the site and the extent and nature of the development.

Impacts on vegetation and protected plant species

Several protected species occur at the site which may be impacted by the development, most notably A*cacia 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 types in the study area are classified as Least Threatened and are still more than 99% intact, Kalahari Karroid Shrubland 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 developments in the area, this is a potential cumulative impact of the development that is assessed.

5 SCOPING PHASE ASSESSMENT OF IMPACTS

The various identified impacts are assessed below for the different phases of the development. It is important to note that this is a scoping-phase assessment and subject to change based on any changes to the project description that might occur before the EIA Phase. The assessed impacts represent the typical case for a single facility, but as there is little difference between the four projects, each facility would generate similar impact. However, cumulative impact would escalate with each additional facility.

5.1 ALLEPAD PV THREE DEVELOPMENT

The following is an assessment of Allepad PV One, for the planning and construction and operational phase of the development.

5.1.1 Planning & Construction Phase

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

Impact			
Impacts on vegetation will occur due to disturbance and vegetation clearing associated with the construction of the facility. In addition, it is highly likely that some loss of individuals of plant SCC will occur.			
Sensitivity Analysis			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Vegetation clearing will result in loss of currently intact vegetation	Habitat loss and impact on plant SCC will occur	Local	The Gravel Plains habitat in the east of the site should be avoided, due to the likely presence of plant SCC. In

			addition the larger contiguous dune area in the west should be avoided as far as possible.

Description of expected significance of impact:

Impacts on vegetation and SCC are likely to be moderate to low, depending on the exact location of the development footprint and the presence of species of concern within the development footprint.

Gaps in Knowledge and recommendations for further study:

- The different habitats mapped in this study are based on satellite imagery and will need to be verified and characterised in the field.
- The density and distribution of plant SCC across the site will need to be characterised to better inform the EIA phase.
- The sensitivity map derived for the site will need to be updated based on the results of the above studies.

Impact 2. Direct Faunal Impacts Due to Construction Activities

Impact

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.

Sensitivity Analysis

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Construction phase disturbance of fauna	Fauna will be disturbed or killed by construction phase disturbance	Local	The Gravel Plains habitat in the east of the site should be avoided, due to the likely significance of this area for fauna. In addition the larger contiguous dune area in the west should be avoided as far as possible.

Description of expected significance of impact: Faunal impacts due to construction activities will be of relatively high intensity given the clearing and site establishment impacts, but this would be of short duration and of moderate overall significance.
Gaps in Knowledge and recommendations for further study: • The fauna associated with the different habitats at the site will need to be verified and characterised in the field. • Important faunal habitats which have not been captured in the sensitivity map will need to be identified and mapped in the field. • The overall impact of the development on fauna and faunal habitats will need to be evaluated in the field based on the proposed layout of the development.

5.1.2 Operational Phase Impacts

Impact 1. Faunal Impacts due to Operation

Impact The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility.			
Sensitivity Analysis			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Operational phase disturbance of fauna	Fauna will be disturbed or killed by operational phase disturbances such as electrocution along the perimeter fence or run over by maintenance vehicles	Local	The development should be restricted to the lower sensitivity parts of the site.
Description of expected significance of impact: Faunal impacts during operation are likely to be of low intensity and of low significance with the implementation of appropriate mitigation.			
Gaps in Knowledge and recommendations for further study: • The fauna associated with the different habitats at the site will need to be verified and characterised in the field.			

- Recommendations regarding the most appropriate avoidance and mitigation measures to the implemented at the site will need to be informed by the fauna present at the site and their distribution and potential movement pathways.

Impact 2. Negative impact on ESAs, CBAs and broad-scale ecological processes.

Impact Development of the PV plant may impact ESAs and broad-scale ecological processes such as the ability of fauna to disperse.			
Sensitivity Analysis			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Presence of the PV Plant may impact broad-scale ecological processes	The presence of the facility may disrupt landscape connectivity for fauna and cause habitat fragmentation	Local	The development should be restricted to the lower sensitivity parts of the site.
Description of expected significance of impact: The impact of the development on CBAs and broad-scale processes is likely to be relatively low and of low overall significance.			
Gaps in Knowledge and recommendations for further study: • The most important areas for faunal movement at the site will need to be investigated and identified in the field at the site and used to inform the final layout of the facility to ensure that important movement corridors are not disrupted by the development.			

5.1.3 Cumulative Impacts

The following are the cumulative impacts that are assessed as being a likely consequence of the development of Allepad PV One. 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 renewable energy developments and other activities in the area.

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

Impact The development of Allepad PV Three will potentially contribute to cumulative habitat loss and other cumulative impacts in the wider Upington area.			
Sensitivity Analysis			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Presence of the PV Plant will contribute to cumulative impact in the area	The area already has a relatively high density of renewable energy development and the Allepad project will contribute further habitat loss and fragmentation.	Local	The development should be restricted to the lower sensitivity parts of the site.
Description of expected significance of impact: The impact of the Allepad PV Three development will need to be considered in light of the other phases of the Allepad project as well as the other developments in the wider area. The development of a single phase would have low significance, but this would increase as the number of phases increased and increasingly sensitive habitats were encroached upon. The development of 3-4 phases at the site would be likely to generate moderate cumulative impact, but potentially this could be reduced to a low level depending on the number and configuration of phases present at the site.			
Gaps in Knowledge and recommendations for further study: • The impact of Allepad PV Three will need to be evaluated in terms of the habitats affected, their distribution and the existing footprint of development in these habitats in the wider Upington area.			

6 CONCLUSION & RECOMMENDATIONS

The vegetation of the site consists of Kalahari Karroid Shrubland in the east and Gordonia Duneveld in the west of the site. The areas of Kalahari Karroid Shrubland in the east are associated with shallow calcrete soils and has numerous drainage lines as well as a few small pans present. This area is considered largely unsuitable for development. The western half of the site on undulating sandy soils is considered to be low sensitivity and suitable for development apart from the extensive area of mobile dunes which is considered to be medium high sensitivity and not suitable for development as the loose sands are very vulnerable to erosion. In addition, it is likely that significant soil disturbance would be required in this area for construction as the dunes would likely need to be at least partly levelled.

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 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 development.

Cumulative impacts in the area are a potential concern due to the proliferation of solar energy development in the wider Upington area. In terms of habitat loss, the Gordonia Duneveld vegetation type is still approximately 99% intact and is also a very extensive vegetation type, with the result that the loss of habitat associated with the development is not considered highly significant given that there are still very large contiguous intact areas available north of the site. The final cumulative impact of the development would depend on the number of phases built at the site as well as their configuration and the extent to which they impinged on the more sensitive habitats at the site.

At this stage of the Scoping process there are no impacts associated with the development that are considered to be of high significance and which cannot be mitigated to an acceptable level. Therefore, based on the results of this assessment, there are no reasons to indicate that the development should not move into the EIA phase for further assessment. A proposed plan of study for the EIA phase is detailed below.

7 PLAN OF STUDY FOR THE EIA PHASE

The current study is based largely on a desktop study and as such, a significant task remaining for the EIA phase is the field assessment to verify and characterise the habitats, vegetation and faunal communities of the site. The following activities and outputs are planned to inform the EIA phase of the development:

- Characterise the vegetation and plant communities present across the site. Including the presence and distribution of plant SCC at the site. This information would be used to further inform the sensitivity map of the site and the site layout if required.

- Map the distribution and estimate the density of protected trees at the site in order to better evaluate the impact of the development on protected tree species.

- Characterise the faunal habitats at the site and identify areas of high faunal value such as drainage lines, pans and other habitats of significance. This information will be used to inform the sensitivity map of the site as well as the layout of the development.

- Provide a more detailed assessment of cumulative impact associated with the development of the site. Including an assessment of the extent of habitat lost to solar energy development in the area to date and the likely future potential loss from the

current as well as other proposed developments in the area. The potential for there to be disruption of broad-scale ecological processes in the area will be examined by evaluating the extent of habitat loss to date and the distribution of this impact in relation to the gradients, corridors and associated processes operating in the area.

- Evaluate, based on the site attributes and final layout of the development, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.

- Assess the impacts identified above in light of the site-specific findings and the final layout for assessment in the EIA Phase to be provided by the developer.

- Address any comments received on the scoping study from I&APs and commenting authorities and ensure that that study complies with best practice and the requirements of the 2014 EIA regulations as amended.

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9 ANNEX 1. LIST OF MAMMALS

List of mammals which are likely to occur in the vicinity of the Allepad site. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2014.2 and South African Red Data Book for Mammals (Friedmann & Daly 2004).

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.	Low
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):				
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.	High
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.	Low
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
Mastomys coucha	Southern Multimammate Mouse	LC	Wide habitat tolerance.	High
Thallomys paedulcus	Acacia Tree Rat	LC	Associated with stands of Acacia woodland	Low
Thallomys nigricauda	Black-tailed Tree Rat	LC	Associated with stands of Acacia woodland	Low

Aethomys 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*	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	High
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	Low
Gerbilliscus brantsii	Higheld Gerbil	LC	Sandy soils or sandy alluvium with some cover of grass, scrub or open woodland	High
Saccostomus campestris	Pouched Mouse	LC	Catholic habitat requirements, commoner in areas where there is a sandy substrate.	High
Malacothrix typica	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
Primates:				
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	Confirmed
Cercopithecus mitis	Vervet Monkey	LC	Most abundant in and near riparian vegetation of savannahs	Confirmed
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.	Low
Erinaceomorpha (Hedgehog)				
Atelerix frontalis	South African Hedgehog	VU	Generally found in semi-arid and subtemperate environments with ample ground cover	Moderate
Carnivora:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	Confirmed
Hyaena brunnea	Brown Hyaena	NT	Nama and Succulent Karoo and the drier parts of the Grassland and Savanna Biomes	Low
Caracal caracal	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	High
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	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	Confirmed
Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Confirmed
Galerella sanguinea	Slender Mongoose	LC	Catholic habitat requirements but does not occur in the south.	Low
Herpestes pulverulentus	Cape Grey Mongoose	LC	Wide habitat tolerance	High
Atilax paludinosus	Marsh Mongoose	LC	Associated with well-watered terrain, living in close association with rivers, streams, marshes, etc.	Moderate
Vulpes chama	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	Confirmed
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	High
Aonyx capensis	African Clawless Otter	LC	Predominantly aquatic and do not occur far from permanent water	Moderate
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	High
Mellivora capensis	Ratel/Honey Badger	LC	Catholic habitat requirements	High
Rumanantia (Antelope):				
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	High
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Confirmed
Chiroptera (Bats)				
Pipistrellus capensis	Cape Serotine Bat	LC	Wide habitat tolerances, but often found near open water	High
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	In arid areas. often associated with water sources	High
Nycteris thebaica	Egyptian Slit-faced Bat	LC	Wide habitat tolerance	High
Rhinolophus denti	Dent's Horseshoe Bat	LC	Arid areas but require caves or rock crevices	High
Rhinolophus darlingi	Darling's Horsehoe Bat	LC	Savanna woodland species but requires caves	Low
Eidolon helvum	Straw-coloured fruit bat	LC	Occasional migratory visitors within southern Africa	Low

10 ANNEX 2. LIST OF REPTILES

List of reptiles which are likely to occur at the vicinity of the Allepad site, based on the SARCA 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	3
Agamidae	*Agama*	*anchietae*		Anchieta's Agama	Least Concern	2
Agamidae	*Agama*	*atra*		Southern Rock Agama	Least Concern	6
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Least Concern	3
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Least Concern	2
Colubridae	*Dipsina*	*multimaculata*		Dwarf Beaked Snake	Least Concern	1
Colubridae	*Prosymna*	*frontalis*		Southwestern Shovel-snout	Least Concern	2
Colubridae	*Psammophis*	*trinasalis*		Fork-marked Sand Snake	Least Concern	2
Colubridae	*Telescopus*	*beetzii*		Beetz's Tiger Snake	Least Concern	2
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern	11
Elapidae	*Aspidelaps*	*lubricus*	*lubricus*	Coral Shield Cobra	Not listed	2
Elapidae	*Naja*	*nivea*		Cape Cobra	Least Concern	1
Gekkonidae	*Chondrodactylus*	*angulifer*	*angulifer*	Common Giant Ground Gecko	Least Concern	6
Gekkonidae	*Chondrodactylus*	*bibronii*		Bibron's Gecko	Least Concern	6
Gekkonidae	*Chondrodactylus*	*turneri*		Turner's Gecko	Least Concern	5
Gekkonidae	*Lygodactylus*	*bradfieldi*		Bradfield's Dwarf Gecko	Least Concern	1
Gekkonidae	*Lygodactylus*	*capensis*	*capensis*	Common Dwarf Gecko	Least Concern	1
Gekkonidae	*Pachydactylus*	*latirostris*		Quartz Gecko	Least Concern	6
Gekkonidae	*Pachydactylus*	*punctatus*		Speckled Gecko	Least Concern	2
Gekkonidae	*Pachydactylus*	*purcelli*		Purcell's Gecko	Least Concern	6
Gekkonidae	*Ptenopus*	*garrulus*	*garrulus*	Common Barking Gecko	Least Concern	1
Gekkonidae	*Ptenopus*	*garrulus*	*maculatus*	Spotted Barking Gecko	Least Concern	1
Lacertidae	*Heliobolus*	*lugubris*		Bushveld Lizard	Least Concern	1
Lacertidae	*Meroles*	*suborbitalis*		Spotted Desert Lizard	Least Concern	3
Lacertidae	*Pedioplanis*	*inornata*		Plain Sand Lizard	Least Concern	3
Lacertidae	*Pedioplanis*	*namaquensis*		Namaqua Sand Lizard	Least Concern	3

Scincidae	*Acontias*	*kgalagadi*	*kgalagadi*	Striped Blind Legless Skink	Least Concern	1
Scincidae	*Acontias*	*lineatus*		Striped Dwarf Legless Skink	Least Concern	4
Scincidae	*Trachylepis*	*occidentalis*		Western Three-striped Skink	Least Concern	3
Scincidae	*Trachylepis*	*sparsa*		Karasburg Tree Skink	Least Concern	3
Scincidae	*Trachylepis*	*spilogaster*		Kalahari Tree Skink	Least Concern	1
Scincidae	*Trachylepis*	*striata*		Striped Skink	Least Concern	4
Scincidae	*Trachylepis*	*sulcata*	*sulcata*	Western Rock Skink	Least Concern	4
Scincidae	*Typhlosaurus*	*lineatus*		Striped Blind Legless Skink	Not listed	1
Testudinidae	*Psammobates*	*tentorius*	*subsp. ?*	Tent Tortoise (subsp. ?)	Least Concern	1
Testudinidae	*Psammobates*	*tentorius*	*verroxii*	Verrox's Tent Tortoise	Not listed	16
Typhlopidae	*Rhinotyphlops*	*schinzi*		Schinz's Beaked Blind Snake	Least Concern	2
Varanidae	*Varanus*	*albigularis*	*albigularis*	Rock Monitor	Least Concern	1
Varanidae	*Varanus*	*niloticus*		Water Monitor	Least Concern	4
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern	1

11 ANNEX 3. LIST OF AMPHIBIANS

List of amphibians which are likely to occur in the vicinity of the Allepad site. Habitat notes and distribution records are based on Du Preez and Carruthers (2009), while conservation status is from the IUCN Red Lists 2014 and Minter et al. (2004).

Scientific Name	Common Name	Status	Habitat	Distribution	Likelihood
Amietophrynus gutturalis	Guttural Toad	Not Threatened	Around open pools, dams, vleis and other semi-permanent or permenent water	Widespread	Low
Amietophrynus poweri	Western Olive Toad	Not Threatened	Around vleis and pans in thornveld savanna	Widespread	Low
Amietophrynus rangeri	Raucous Toad	Not Threatened	Rivers and stream in grassland and fynbos	Endemic	Low
Vandijkophrynus gariepensis	Karoo Toad	Not Threatened	Karoo Scrub	Widespread	High
Pyxicephalus adspersus	Giant Bullfrog	Near Threatened	Breed in shallow margins of rain-filled depressions.	Widespread	Low
Xenopus laevis	Common Platanna	Not Threatened	Any more or less permanent water	Widespread	High
Cacosternum boettgeri	Common Caco	Not Threatened	Marshy areas, vleis and shallow pans	Widespread	High
Amietia angolensis	Common River Frog	Not Threatened	Banks of slow-flowing streams or permanent bodies of water	Widespread	High
Tomopterna cryptotis	Tremelo Sand Frog	Not Threatened	Savanna and grassland	Widespread	High
Tomopterna tandyi	Tandy's Sand Frog	Not Threatened	Nama karoo grassland and savanna	Widespread	High