SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED HYPERION SOLAR DEVELOPMENT 2 AND ASSOCIATED INFRASTRUCTURE NEAR KATHU, NORTHERN CAPE:

FAUNA & FLORA SPECIALIST SCOPING REPORT

PRODUCED FOR SAVANNAH ENVIRONMENTAL

BY

3Foxes Biodiversity Solutions

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September 2018

EXECUTIVE SUMMARY

Cyraguard (Pty) Ltd is proposing the establishment of a 75MW commercial Photovoltaic (PV) solar energy facility (SEF) and associated infrastructure, called Hyperion Solar Development 2 (proposed development), on the Remainder of the Farm Lyndoch 432, situated in the Gamagara Local Municipality in the Northern Cape Province. Three additional 75MW SEFs and associated infrastructure are proposed within the same property (project site) and will be submitted as separate projects. This report has been compiled specifically for the Hyperion Solar Development 2 including associated infrastructure. The proposed development is currently in the Scoping Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity scoping study of the project site as part of the Scoping and Environmental Impact Assessment (EIA) process.

A short 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 project site. The project 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 project site has a high abundance of *Acacia erioloba* and *Acacia haematoxylon*, which are nationally protected tree species. Although relatively large numbers of *Acacia haematoxylon* (2000-6000) would potentially be lost within each SEF proposed at the Hyperion site, this species is very abundant in the area and the local population would not be compromised. DAFF should however be engaged in this regard to investigate potential mechanisms to negate, reduce or offset the negative impact on the protected tree species within the project site.

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 wider Kathu area. In terms of habitat loss, the affected Kathu Bushveld vegetation type is still approximately 90% intact and while this is not a very extensive vegetation type, the loss of approximately 180ha of habitat associated with each 75MW development footprint is however not considered highly significant given that there are still relatively large contiguous intact areas available adjacent to the site. However, the development of all four Hyperion SEFs would generate over 700ha of habitat loss which is considered to generate a moderate local cumulative impact. In terms of potential losses to landscape connectivity, the Vlermuisleegte River is clearly an important corridor that runs through the project site, but would not be significantly impacted by the proposed development. In terms of the two proposed site access roads, the existing access road from the N14 is clearly the preferred alternative as there is already a substantial access route available and any required upgrades would be minor in nature. There is no existing access along the alternative route and the construction of a road along this alignment would result in significant habitat loss compared to the existing access.

There are no likely ecological impacts of high significance associated with the proposed development which cannot be mitigated to an acceptable level. Therefore, based on the results of this assessment, there are no reasons to suggest that the proposed development should not move into the EIA phase. 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

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Ecological Solutions for People & the Environment

Simon Todd is Director and principal scientist at 3Foxes Biodiversity Solutions and has over 20 years of experience in biodiversity measurement, management and assessment. He has provided specialist ecological input on more than 200 different developments distributed widely across the country. This includes input on the Wind and Solar SEA (REDZ) as well as the Eskom Grid Infrastructure (EGI) SEA and Karoo Shale Gas SEA. He is on the National Vegetation Map Committee as representative of the Nama and Succulent Karoo Biomes. Simon Todd is a recognised ecological expert and is a past chairman and current deputy chair of the Arid-Zone Ecology Forum. He is registered with the South African Council for Natural Scientific Professions (No. 400425/11).

A selection of recent work is as follows:

Strategic Environmental Assessments

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

Recent Specialist Ecological Studies in the Vicinity of the Current Site

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

SPECIALIST DECLARATION

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

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

Signature of the specialist: 

Name of Specialist: ____Simon Todd_____

Date: ____08 October 2018_____

1 INTRODUCTION

Cyraguard (Pty) Ltd is proposing the establishment of a 75MW commercial Photovoltaic (PV) solar energy facility (SEF) and associated infrastructure, called Hyperion Solar Development 2 (proposed development), on the Remainder of the Farm Lyndoch 432, situated in the Gamagara Local Municipality in the Northern Cape Province. Three additional 75MW SEFs and associated infrastructure are proposed within the same property (project site) and will be submitted as separate projects. This report has been compiled specifically for the Hyperion Solar Development 2 including associated infrastructure. The proposed development is currently in the Scoping Phase and 3Foxes Biodiversity Solutions has been appointed to provide a specialist terrestrial biodiversity scoping study of the project site as part of the Scoping and Environmental Impact Assessment (EIA) process.

The purpose of the Hyperion Solar Development 2 Terrestrial Biodiversity Scoping Report is to describe and detail the ecological features of the project site, provide a preliminary assessment of the ecological sensitivity of the project site, and identify the likely impacts that may be associated with the proposed development area as a SEF. A site visit 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 project site. This information is used to derive a draft ecological sensitivity map that presents the ecological constraints and opportunities for proposed development at the project site. The information and sensitivity map presented here provides an ecological baseline that should be used in the planning phase to ensure that the potential negative ecological impacts associated with the proposed 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 (PoS) for the EIA phase which will follow the Scoping phase. 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 development
- a description and evaluation of environmental issues and potential impacts (incl. using direct, indirect and cumulative impacts) that have been identified
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts
- an indication of the methodology used in determining the significance of potential environmental impacts
- an assessment of the significance of direct indirect and cumulative impacts in terms of the following criteria:

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

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

General Considerations:

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

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

- Preconstruction
- Construction
- Operational Phase

1.1 ASSESSMENT APPROACH & PHILOSOPHY

This assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 326, as amended) 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 the proposed development 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 EMPr for faunal related issues.

Other pattern issues

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover of the project 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 project 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 project site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the project 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 proposed development will be identified.
- The opportunities and constraints for proposed 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 proposed development is located within the project site on the Remaining Extent (Portion 0) of the farm Lyndoch 432, situated north of Kathu in the Northern Cape Province (Figure 1). Hyperion Solar Development 2 is to consist of solar photovoltaic (PV) technology with fixed, single and double axis tracking mounting structures, with a net generation (contracted) capacity of 75 MW_{AC}, as well as associated infrastructure, which will include:

- Several arrays of photovoltaic solar panels;
- Mounting structures to support the PV panels;
- Cabling between the project components, to be laid underground where practical;
- On-site inverters to convert the power from a direct current to an alternating current;
- An on-site substation to facilitate the connection between the solar energy facility and the Eskom electricity grid;
- A new 132kV power line between the on-site substation and the existing Ferrum Substation[1];
- Battery storage facilities;
- Water purification plant;
- Site Offices and Maintenance Buildings, including workshop areas for maintenance and storage;
- Batching plant;
- Temporary laydown areas;
- Internal access roads and fencing around the development area;
- Access road from the project site to the N14. Two access road alternatives will be considered:
    - Upgrade approximately 3,6km of the T26 gravel road between the project site and the N14 (Alternative 1); and
    - The construction of a new access road and the formalisation of an informal access road between the project site and the T25 gravel road, approximately 5km in length (Alternative 2).

[1] The construction of the 132kV overhead power line will be assessed as part of a separate Basic Assessment process and do not form part of this assessment.

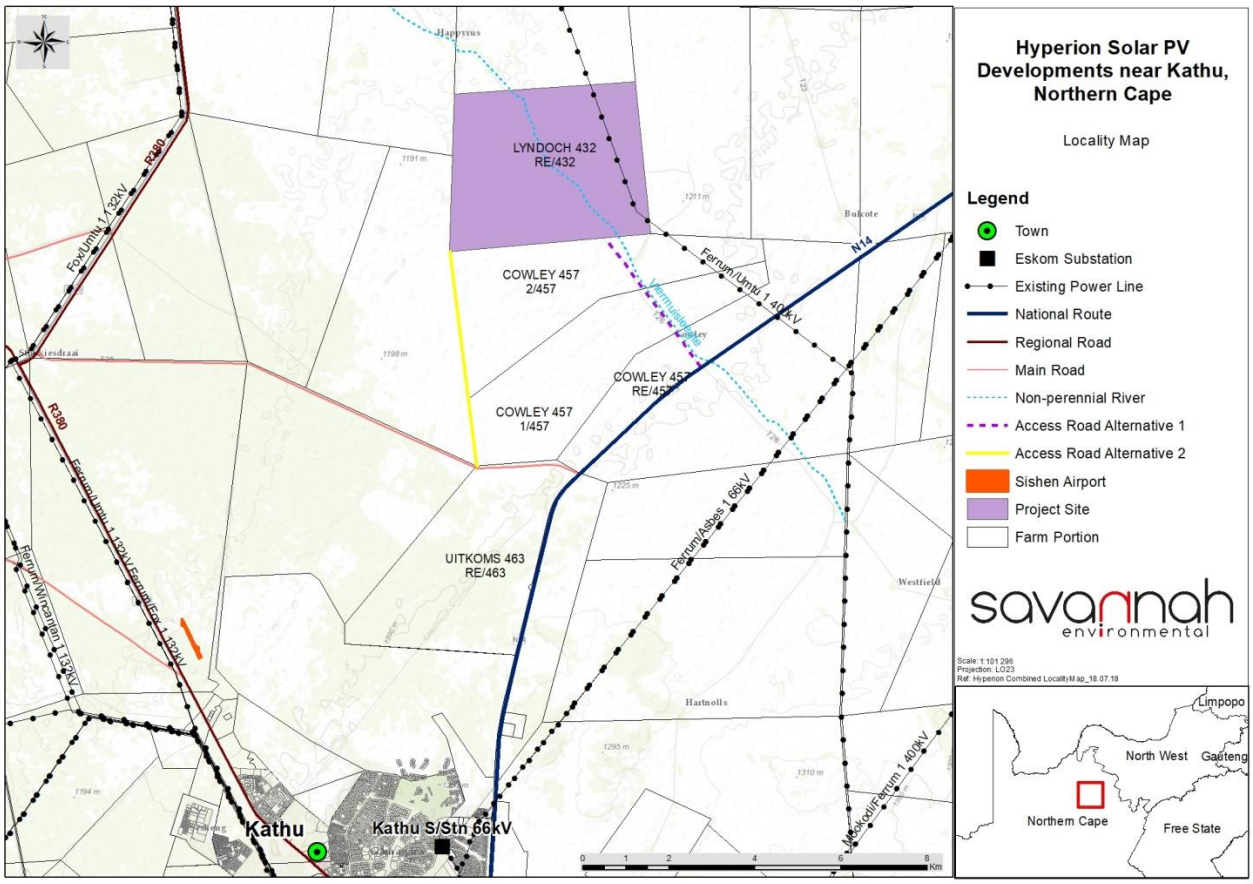

Figure 1. Map showing the location of the Hyperion Solar PV development site in relation to Kathu and the two access road alternatives (courtesy of Savannah Environmental (Pty) Ltd).

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 project site, but this is

necessary to ensure a conservative approach as well as counter the fact that the project 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 project 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 Animal Demography Unit (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 project 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 SITE VISITS & FIELD ASSESSMENT

The site was visited on the 21st of July 2018. During the site visit, the different biodiversity features, habitat, and landscape units present at the site were identified and mapped in the field. Specific features visible on the satellite imagery of the site were also marked for field inspection and were verified and assessed during the site visit. Walk-through-surveys were conducted within representative areas across the different habitat units identified and all plant and animal species observed were recorded. Active searches for reptiles and amphibians were also conducted within habitats likely to harbour or be important for such.

The presence of sensitive habitats such as stands of large trees, pans or rocky outcrops were noted in the field where present and recorded on a GPS. The conditions at the time of the site visit were adequate for the field assessment. Although it was winter, it had been a late season and the dominant grasses and shrubs were all still clearly identifiable. Although it is likely that some forbs and geophytes present were not observed, these are not likely to significantly affect the overall sensitivity mapping of the site. Although the site visit was too short to adequately characterise the fauna present on the site, the consultant is very familiar with the area and information on faunal presence from numerous nearby sites is used to inform the current study as appropriate. Given that the site was visited for the current study and that the sensitivity patterns observed are robust to the minor uncertainties present, there are no major limitations associated with the current study that would compromise the broad findings.

2.3 SENSITIVITY MAPPING & ASSESSMENT

An ecological sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in the literature and various spatial databases with mapping based on the satellite imagery as well as personal knowledge of the project site. This includes delineating different habitat units identified on the satellite imagery and assigning likely sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. Most types of development can proceed within these areas with little ecological impact.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. These areas usually comprise the bulk of habitats within an area. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.

- **Very High/No-Go** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible.

2.4 SAMPLING LIMITATIONS AND ASSUMPTIONS

The current study included a field assessment as well as a desktop study, which serves to significantly reduce the limitations and assumptions of the study. For the current assessment, the vegetation was in a good 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.

In terms of fauna, detailed studies were not conducted for the Scoping study, but several factors reduce the uncertainty associated with the assessment. 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 on the numerous study areas, in the Kathu area. Many remote areas have not been well-sampled in the past with the result that the species lists derived from the available spatial databases for the area do not always adequately reflect the actual fauna present at the project site. This is acknowledged as a limitation of the study, however, it is substantially reduced given the previous experience in the area. In order to further reduce this limitation, and ensure a conservative approach, the species lists derived for the project site from the literature were obtained from an area significantly larger than the project site and are likely to include a much wider array of species than actually occur at the project site. This is a cautious and conservative approach which takes the study limitations into account.

More detailed vegetation and faunal surveys will be undertaken as part of the EIA Phase once the development footprint has been finalised.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

3.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford 2006), the project site is restricted to the Kathu Bushveld vegetation type. 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 project site in the next section. Other vegetation types that occur in the wider area include Kuruman Thornveld to the east and Kuruman Mountain Bushveld to the south and east, neither of which is of conservation concern or occur within the project site.

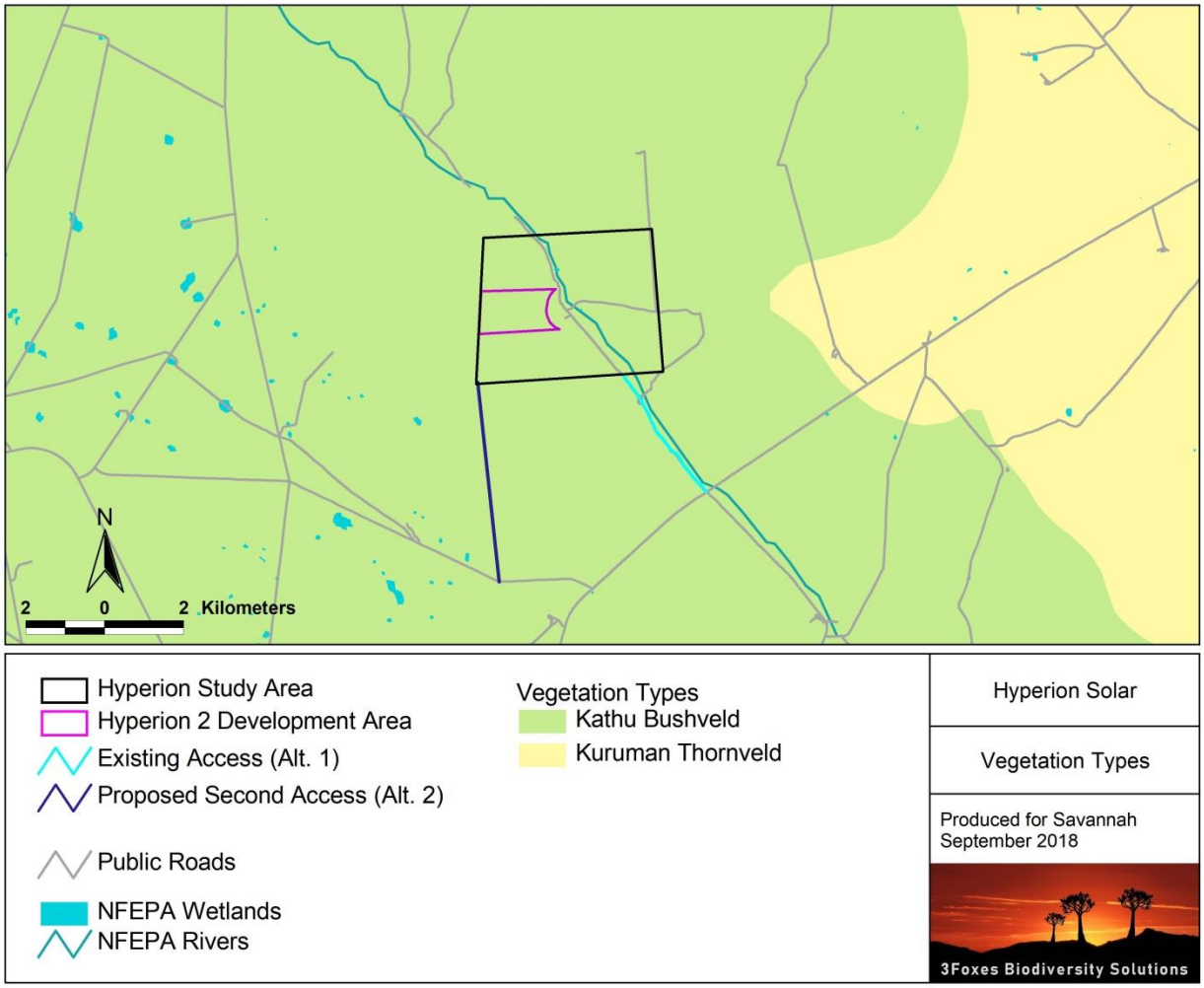

Figure 2. Broad-scale overview of the vegetation in and around the Hyperion site. The vegetation map is an extract of the national vegetation map as produced by Mucina and Rutherford (2006/2012), and also includes drainage lines and wetlands delineated under the NFEPA assessment (Nel et al. 2011).

3.2 HABITATS & PLANT COMMUNITIES

The vegetation of the project site consists of Bushveld with a well-developed tree layer and a variable-density grass layer. Three broad vegetation communities can be identified, the area west of the Vlermuisleegte River, the river itself and the area east of the Vlermuisleegte River. The area west of the river is largely dominated by *Tarchonanthus camphoratus* and *Acacia haematoxylon* with a few areas where *Acacia erioloba* and/or *Acacia mellifera* become dominant. In the area east of the river, the vegetation is generally more open and largely dominated by *Acacia erioloba* with some localised areas dominated by *Acacia mellifera* or *Terminalia sericea*. The Vlermuisleegte River does not flow on a regular basis and has largely been in-filled with sand. It is characterised by a high density of large *Acacia erioloba* trees. Apart from the above dominant trees other common woody species present at the site include *Zizyphus mucronata*, *Gymnosporia buxifolia*, *Acacia mellifera* subsp. *detinens*, *Searsia ciliata*, *Ehretia rigida* subsp. *rigida*, *Diospyros lycioides* subsp. *lycioides* and *Grewia flava*. The grass layer is dominated by *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*. The density and diversity of shrubs is fairly low but includes *Asparagus laricinus*, *Asparagus retrofractus*, *Felicia muricata* subsp. c*inerascens*, *Pentzia calcarea*, *Acacia hebeclada*, *Hermannia tomentosa*, *Gnidia polycephala* and *Lantana rugosa*. Forbs included *Dicoma schinzii*, *Geigeria ornativa*, *Elephantorrhiza elephantina*, *Indigofera daleoides* var. *daleoides* and *Gisekia pharnacioides* var. *pharnacioides*.

Figure 3. Looking northeast over the western part of the site, showing the typical vegetation within the proposed development footprint. The vegetation is dominated by *Tarchonanthus camphoratus* and *Acacia haematoxylon* with occasional *Acacia erioloba*.

Figure 4. Looking northwest over the western part of the project site, showing an area with higher *Acacia erioloba* density.

Figure 5. Example of the vegetation from east of the Vlermuisleegte River, showing a dense stand of *Terminalia sericea*.

Figure 6. Second example of the vegetation east of the river, showing the typical structure of the vegetation with a fairly dense tree layer dominated by *Acacia erioloba* and a well-developed grass layer.

Figure 7. Vegetation of the Vlermuisleegte River, showing the large *Acacia erioloba* trees that characterise the river bed.

3.3 LISTED AND PROTECTED PLANT SPECIES

Two NFA-protected tree species occur at the site, *Acacia erioloba* and *Acacia haematoxylon*. The density of both species is fairly high across the site and it would not be possible to avoid impact on these species. Although *Acacia erioloba* has a higher density in some parts of the site, *Acacia haematoxylon* is widely distributed across the project site and there are no areas where this species does not occur. The density of *Acacia haematoxylon* at the project site varies from less than 10 trees/ha to approximately 50 trees/ha in the higher density areas. As a result, several thousand trees would likely be lost as a result of the proposed development. This species is however very common in the area and their loss from the development footprint would not compromise the local population. Although *Acacia erioloba* occurs at a lower density than *Acacia haematoxylon*, several thousand trees would also likely be impacted across all four PV SEFs. As a large number of both of these species would be impacted by the proposed development, it is likely that DAFF will request some sort of offset for the development. The exact nature of this offset will likely need to be determined through interaction with DAFF during the EIA process.

Apart from the above species it is possible that Devils' Claw *Harpagophytum procumbens* is present at the site, although it was not observed during the site visit. This is provincially protected species that is common within certain Kalahari veld types and is widespread and

common in the area with the result that the presence of this species at the site would not be of high significance.

3.4 FAUNAL COMMUNITIES

3.4.1 Mammals

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

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

3.4.2 Reptiles

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

Species observed in the area in the past include Serrated Tent Tortoise *Psammobates oculifer*, Cape Cobra *Naja nivea*, Ground Agama *Agama aculeata*, Spotted Sand Lizard *Pedioplanis lineoocellata*, Variable Skink *Trachylepis varia*, Bibron's Blind Snake *Afrotyphlops bibronii*, Western Rock Skink *Mabuya sulcata sulcata*, 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.

3.4.3 Amphibians

The project site lies within or near the range of 10 amphibian species, indicating that the project site potentially has a moderately diverse frog community for an arid area. There is no natural permanent water or artificial earth dams within the project site that would represent suitable breeding habitat for most of these species. The pans which are present at the site would occasionally contain sufficient water for breeding purposes for those species which do not require permanent water. Given the paucity of permanent water at the site, only those species which are relatively independent of water are likely to occur in the area. Species 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 project site. There is no standing water on the project site that could be used by amphibians for breeding purposes.

The only species of conservation concern which occurs in the wider area is the Giant Bullfrog *Pyxicephalus adspersus*. The project 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 project site, suggesting that it is unlikely to occur there. Impacts on amphibians are however likely to be low and restricted largely to habitat loss during construction.

3.5 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 8. The majority of the project site lies within an area classified as "Other natural areas" and is not classified as a CBA or Ecological Support Area (ESA). The Vlermuisleegte River corridor is however classified as an ESA and would be marginally impacted by the proposed development. There are no CBAs in close proximity to the project site, indicating that the proposed development does not pose a threat to any CBAs or other areas considered to be of significance from a broad-scale conservation planning perspective. In terms of the two access road options, Alternative 1, the existing access route runs adjacent to the Vlermuisleegte river, which is a potential concern, but the

existing road is already used by heavy vehicles and any required upgrades would be minor in nature and not likely to generate significant additional impact to the affected ESA. However, the alternative access route does not have an existing road and significant additional habitat loss would be associated with this option, which includes a small extent of CBA 1 and a larger extent of CBA 2. The section where the CBA occurs has a high density of *Acacia erioloba* that would be difficult to avoid. As such, it is clear that the existing road Alternative 1 is preferred in terms of potential impacts on CBAs and broad scale ecological processes.

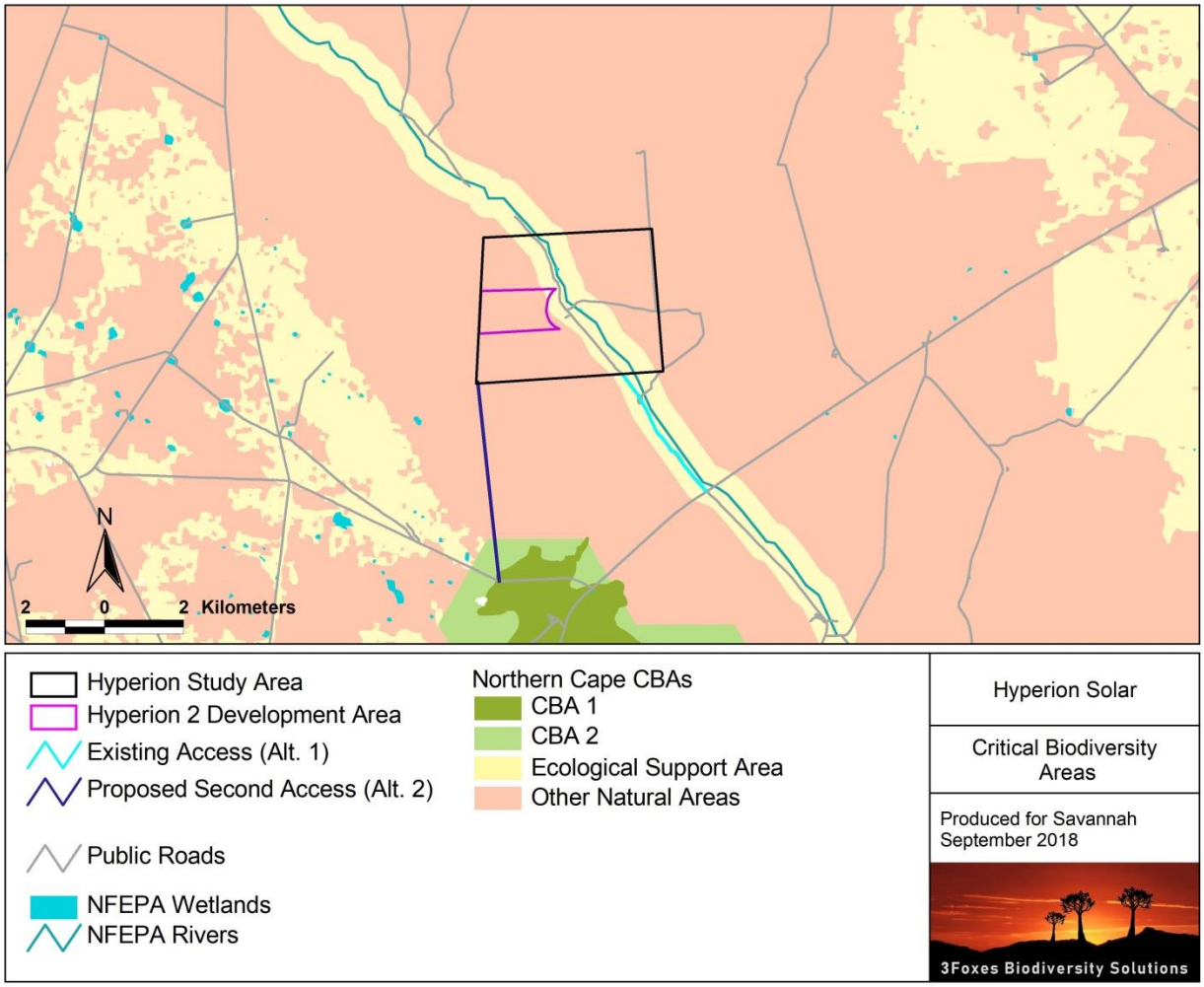

Figure 8. Extract of the Northern Cape Critical Biodiversity Areas map for the study area, showing that there are no CBAs in close proximity to the site, but access road Alternative 2 does go through a short area of CBA 1 and CBA 2.

3.6 CURRENT BASELINE & CUMULATIVE IMPACT

There are numerous other proposed PV facilities in the wider area surrounding the project site (Figure 9). There are several existing PV projects in the Kathu area including the already built Kalahari Solar, Kathu Solar and Sishen Solar Farms. The existing plants are considered to form part of the existing baseline for the area and represent existing impacts. The footprint of these is however relatively low in comparison with the footprint of the iron and manganese mines in the area, which are currently the major driver of habitat loss and transformation in the Hotazel-Kuruman-Kathu area. There are several authorised developments in the general vicinity to the project site, raising the potential for cumulative impact in the area, especially within the Kathu Bushveld vegetation type. However, the overall development pressure in the wider area is still relatively low and while the Vlermuisleegte River is considered to represent an important movement corridor for fauna, the development area is relatively homogenous, suggesting that the affected area is not likely to be of high significance for landscape connectivity. Consequently, the overall extent of cumulative impact due to the solar energy development in the area is seen to be relatively low and the contribution of the current proposed 4x75MW developments to the cumulative impact is seen as moderate but of local significance only.

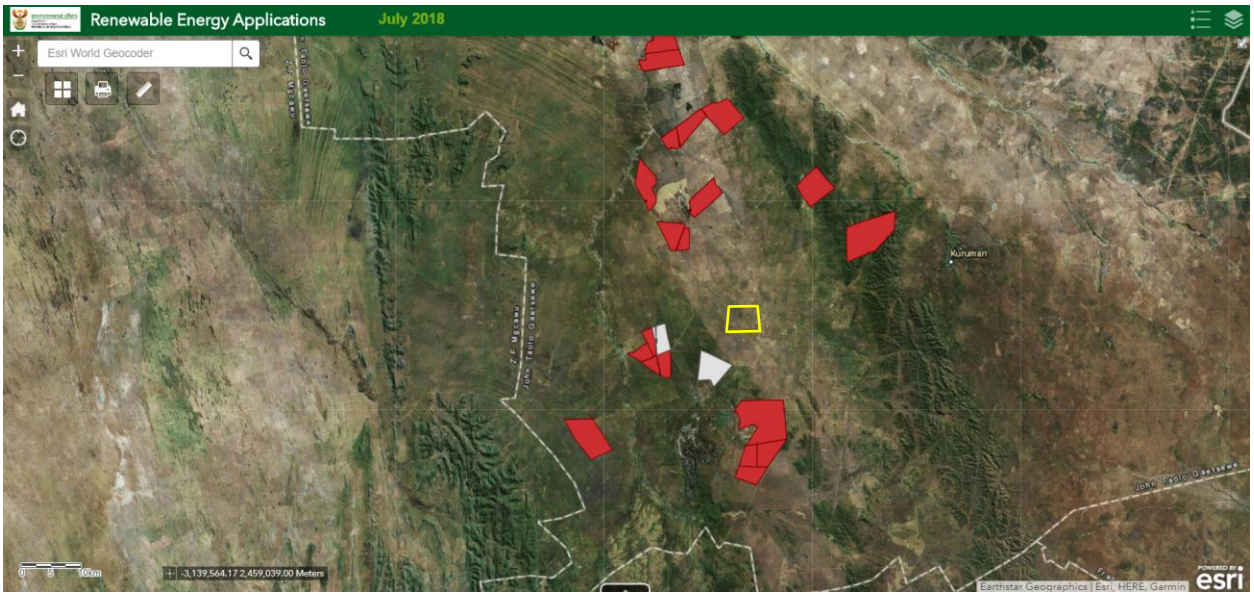

Figure 9. Map of DEA registered renewable energy applications as at July 2018, showing the Hyperion site in yellow.

3.7 SITE SENSITIVITY ASSESSMENT

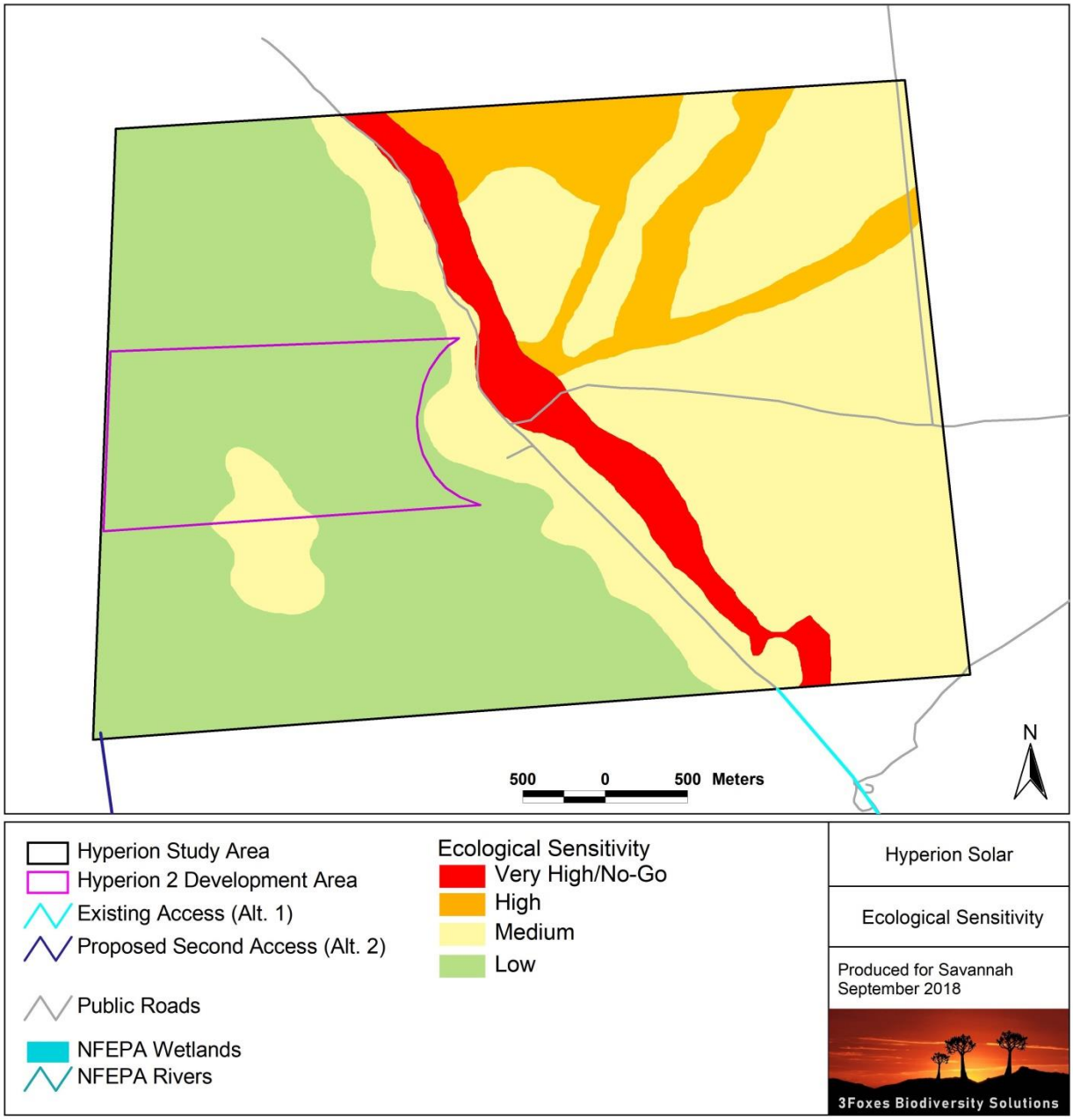

Figure 10. Sensitivity map for the Hyperion Solar Development 2 development area and the wider Hyperion site.

The sensitivity map for the project site and development area associated with Hyperion Solar Development 2 is illustrated above in Figure 10. The main sensitive feature of the project site is the Vlermuisleegte River which is considered to be unsuitable for development and is therefore considered to be a no-go area for all project components apart from the

existing access road which impinges marginally into this area. The majority of the area east of the Vlermuisleegte River has a moderate to high *Acacia erioloba* density and is considered Medium or High sensitivity. This part of the site is considered significantly higher sensitivity than the area west of the Vlermuisleegte River due firstly to the high abundance of protected tree species, but also secondly due to the higher habitat diversity and associated value of this part of the site for fauna.

The majority of the western half of the project site is considered low sensitivity due to the lower abundance of protected tree species and dominance of *Tarchonanthus camphoratus* which is generally an indicator of poor veld condition. There is a low stony ridge in the central part of this half of the project site which projects into the Hyperion Development 2 area and which is considered to be medium sensitivity as it has higher plant diversity and is a relatively rare habitat in context of the site. However, no species of high conservation concern were observed in this area and is considered potentially suitable for development.

The proposed development area is restricted to the western half of the project site, which is considered to be the lower sensitivity part of the project site. Based on the results of this study, the developer has chosen to avoid the higher sensitivity areas east of the Vlermuisleegte River and restrict the proposed development to the lower sensitivity areas west of the River. However, although the density of protected trees west of the river is much lower than the areas to the east, the overall number trees that are likely to be affected by the development is still relatively high. There are however no parts of the site which would allow the development to proceed without some impact to protected trees and *Acacia erioloba* and *Acacia haematoxylon* in particular. The loss of the individuals within the proposed development footprint is unavoidable. Depending on the exact location of the final development footprint and the number of protected trees within the footprint, it is possible that the development would exceed the threshold for an offset requirement from DAFF for NFA protected species.

4 IDENTIFICATION & NATURE OF IMPACTS

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

4.1 IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES

Potential ecological impacts resulting from the proposed development of the Hyperion Solar Development 2 and associated infrastructure and access roads would stem from a variety of different activities and risk factors associated with the preconstruction, construction and operational phases of the project including the following:

Impacts on vegetation and protected plant species

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

Direct faunal impacts

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

Impact on CBAs and 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, this is a potential cumulative impact of the development that is assessed.

5 SCOPING PHASE ASSESSMENT OF POTENTIAL IMPACTS

The various identified potential impacts are assessed below for the different phases of the proposed development. It is important to note that this is a scoping-phase assessment and subject to change based on any changes to the layout or project description that might occur before the EIA Phase. The assessed impacts represent the typical case for a single SEF, but as there is little difference between the four proposed projects, each SEF would

generate similar impact. However, cumulative impact would escalate with each additional SEF.

5.1 HYPERION SOLAR DEVELOPMENT 2

The following is an assessment of the Hyperion Solar Development 2 and associated infrastructure, for the planning and construction and operational phase of the proposed development, for a single phase.

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 SEF and the upgrading of existing access roads. In addition, it is highly likely that some loss of individuals of plant species of conservation concern 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 Species of Conservation Concern (SCC) will occur	Local	The bed of the Vlermuisleegte River should be considered to be a no-go area apart from where there are already existing access roads through this area which can be used for access. The areas of high tree density east of the Vlermuisleegte River are also considered unsuitable for development.
Description of expected significance of impact: Impacts on vegetation and SCC are likely to be of moderate significance, depending on the exact location of the development footprint and the density of protected tree species within the development footprint.			
Gaps in Knowledge and recommendations for further study:			

- The density and distribution of protected trees and other plant SCC across the site will need to be characterised and quantified within the proposed development footprint to better inform the EIA phase.
- The sensitivity map derived for the site may 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 bed of the Vlermuisleegte River should be considered to be a no-go area apart from where there are already existing access roads through this area which can be used for access. The areas of high tree density east of the Vlermuisleegte River are also considered unsuitable for development.

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 to low 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 during the EIA Phase.

- 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 SEF 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 bed of the Vlermuisleegte River should be considered to be a no-go area apart from where there are already existing access roads through this area which can be used for access.
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 SEF and associated infrastructure may impact CBAs, 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 SEF may impact broad-scale ecological processes, while the access roads may impact on CBAs and ESAs	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. While it is clear that the Vlermuisleegte River is an important feature, there may also be other areas running to and from the river which are important.

6 CONCLUSION & RECOMMENDATIONS

Although the Hyperion Solar Development 2 is in the Scoping Phase, the current study is based on a field assessment of the project site and the proposed development area as well as a desktop study. Consequently, the scoping impact assessment and sensitivity map presented herein are based on detailed on-site information and as such have a high degree of confidence. Consequently, there is little uncertainty with regards to the results of the current study and the conclusions reached are based on actual information collected at the project site.

The vegetation of the project site consists of Kathu Bushveld with a relatively high abundance of *Acacia erioloba* and *Acacia haematoxylon* and the loss of relatively high numbers of individuals of these species cannot be avoided should the proposed development proceed. Although relatively large numbers of *Acacia haematoxylon* (2000-6000) would potentially be lost within each SEF proposed at the Hyperion site, this species

is very abundant in the area and the local population would not be compromised. DAFF should however be engaged in this regard to investigate potential mechanisms to negate, reduce or offset the negative impact on the protected tree species within the project site.

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 wider Kathu area. In terms of habitat loss, the affected Kathu Bushveld vegetation type is still approximately 90% intact and while this is not a very extensive vegetation type**,** the loss of approximately 180ha of habitat associated with each 75MW development footprint is however not considered highly significant given that there are still relatively large contiguous intact areas available adjacent to the site. However, the development of all four (4) SEFs would generate over 700ha of habitat loss which is considered to generate a moderate local cumulative impact. In terms of potential losses to landscape connectivity, the Vlermuisleegte River is clearly an important corridor that runs through the project site, but would not be significantly impacted by the proposed development. In terms of the two proposed site access roads, the existing access road from the N14 is clearly the preferred alternative as there is already a substantial access route available and any required upgrades would be minor in nature. There is no existing access along the alternative route and the construction of a road along this alignment would result in significant habitat loss compared to the existing access.

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

7 PLAN OF STUDY FOR THE EIA PHASE

As mentioned above, the current study is based on a site visit which serves to reduce the limitations associated with the current study. However, the footprint of the SEF had not been finalised at the time of the site and additional fieldwork to characterise the vegetation and habitat features within the proposed development footprint is required to inform the EIA phase. Based on the results of the current study and the features of the site, the following activities and outputs are planned to inform the EIA phase of the proposed development:

- Quantify the number of individuals of *Acacia erioloba* and *Acacia haematoxylon* affected within each SEF development footprint more accurately so that this can inform the assessment as well as any required offset calculation.

- Provide a more detailed assessment of cumulative impact associated with the proposed development of the project 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 proposed development, what the most applicable mitigation measures to reduce the impact of the proposed development on the project site would be and if there are any areas where specific pre-cautions or mitigation measures should be implemented. Particular attention will be paid to potential impacts on important landscape features in the vicinity of the project site such as the Vlermuisleegte River area.

- Assess the potential 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 IAPs 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 PLANT SPECIES

List of plant species confirmed present at the Hyperion 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 Hyperion site. Conservation status is from 2016 EWT/SANBI Red List.

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

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

11 ANNEX 2. LIST OF REPTILES

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

Family	Scientific name	Common name	Red list category	Number of records
Agamidae	*Agama aculeata aculeata*	Common Ground Agama	Least Concern (SARCA 2014)	41
Agamidae	*Agama atra*	Southern Rock Agama	Least Concern (SARCA 2014)	17
Amphisbaenidae	*Monopeltis mauricei*	Maurice's Worm Lizard	Least Concern (SARCA 2014)	1
Amphisbaenidae	*Zygaspis quadrifrons*	Kalahari Dwarf Worm Lizard	Least Concern (SARCA 2014)	4
Chamaeleonidae	*Chamaeleo dilepis dilepis*	Common Flap-neck Chameleon	Least Concern (SARCA 2014)	8
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern (SARCA 2014)	2
Colubridae	*Dispholidus typus typus*	Boomslang	Least Concern (SARCA 2014)	3
Colubridae	*Philothamnus semivariegatus*	Spotted Bush Snake	Least Concern (SARCA 2014)	1
Colubridae	*Telescopus semiannulatus semiannulatus*	Eastern Tiger Snake	Least Concern (SARCA 2014)	9
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	Least Concern (SARCA 2014)	7
Elapidae	*Aspidelaps scutatus scutatus*	Speckled Shield Cobra	Least Concern (SARCA 2014)	4
Elapidae	*Dendroaspis polylepis*	Black Mamba	Least Concern (SARCA 2014)	1
Elapidae	*Naja nigricincta woodi*	Black Spitting Cobra	Least Concern (SARCA 2014)	2
Elapidae	*Naja nivea*	Cape Cobra	Least Concern (SARCA 2014)	4
Gekkonidae	*Chondrodactylus angulifer*	Giant Ground Gecko	Least Concern (IUCN 2009)	4
Gekkonidae	*Chondrodactylus angulifer angulifer*	Common Giant Ground Gecko	Least Concern (SARCA 2014)	9
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	Least Concern (SARCA 2014)	3
Gekkonidae	*Lygodactylus bradfieldi*	Bradfield's Dwarf Gecko	Least Concern (SARCA 2014)	1
Gekkonidae	*Lygodactylus capensis capensis*	Common Dwarf Gecko	Least Concern (SARCA 2014)	8
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	Least Concern (SARCA 2014)	14
Gekkonidae	*Pachydactylus rugosus*	Common Rough Gecko	Least Concern (SARCA 2014)	1
Gekkonidae	*Pachydactylus wahlbergii wahlbergii*	Kalahari Ground Gecko	Least Concern (SARCA 2014)	12
Gekkonidae	*Ptenopus garrulus garrulus*	Common Barking Gecko	Least Concern (SARCA 2014)	12
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	1
Lacertidae	*Heliobolus lugubris*	Bushveld Lizard	Least Concern (SARCA 2014)	23
Lacertidae	*Meroles squamulosus*	Common Rough-scaled Lizard	Least Concern (SARCA 2014)	3
Lacertidae	*Nucras intertexta*	Spotted Sandveld Lizard	Least Concern (SARCA 2014)	14

Lacertidae	*Pedioplanis lineoocellata lineoocellata*	Spotted Sand Lizard	Least Concern (SARCA 2014)	37
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	Least Concern (SARCA 2014)	4
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater	Least Concern (SARCA 2014)	1
Lamprophiidae	*Atractaspis bibronii*	Bibron's Stiletto Snake	Least Concern (SARCA 2014)	4
Lamprophiidae	*Atractaspis duerdeni*	Duerden's Stiletto Snake	Least Concern (SARCA 2014)	1
Lamprophiidae	*Boaedon capensis*	Brown House Snake	Least Concern (SARCA 2014)	9
Lamprophiidae	*Lycophidion capense capense*	Cape Wolf Snake	Least Concern (SARCA 2014)	4
Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	Least Concern (SARCA 2014)	6
Lamprophiidae	*Psammophis brevirostris*	Short-snouted Grass Snake	Least Concern (SARCA 2014)	9
Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	Least Concern (SARCA 2014)	1
Lamprophiidae	*Psammophis trinasalis*	Fork-marked Sand Snake	Least Concern (SARCA 2014)	10
Lamprophiidae	*Pseudaspis cana*	Mole Snake	Least Concern (SARCA 2014)	7
Lamprophiidae	*Xenocalamus bicolor bicolor*	Bicoloured Quill-snouted Snake	Least Concern (SARCA 2014)	1
Leptotyphlopidae	*Leptotyphlops scutifrons scutifrons*	Peters' Thread Snake		6
Pelomedusidae	*Pelomedusa subrufa*	Central Marsh Terrapin	Least Concern (SARCA 2014)	4
Pythonidae	*Python natalensis*	Southern African Python	Least Concern (SARCA 2014)	1
Scincidae	*Acontias kgalagadi kgalagadi*	Striped Blind Legless Skink	Least Concern (SARCA 2014)	6
Scincidae	*Panaspis wahlbergi*	Wahlberg's Snake-eyed Skink	Least Concern (SARCA 2014)	1
Scincidae	*Trachylepis occidentalis*	Western Three-striped Skink	Least Concern (SARCA 2014)	12
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern (SARCA 2014)	12
Scincidae	*Trachylepis punctulata*	Speckled Sand Skink	Least Concern (SARCA 2014)	1
Scincidae	*Trachylepis spilogaster*	Kalahari Tree Skink	Least Concern (SARCA 2014)	38
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	Least Concern (SARCA 2014)	15
Scincidae	*Trachylepis variegata*	Variegated Skink	Least Concern (SARCA 2014)	49
Testudinidae	*Psammobates oculifer*	Serrated Tent Tortoise	Least Concern (SARCA 2014)	10
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	Least Concern (SARCA 2014)	3
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	Least Concern (SARCA 2014)	1
Varanidae	*Varanus albigularis albigularis*	Rock Monitor	Least Concern (SARCA 2014)	13
Viperidae	*Bitis arietans arietans*	Puff Adder	Least Concern (SARCA 2014)	10

12 ANNEX 3. LIST OF AMPHIBIANS

List of amphibians which are likely to occur in the vicinity of the Hyperion 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