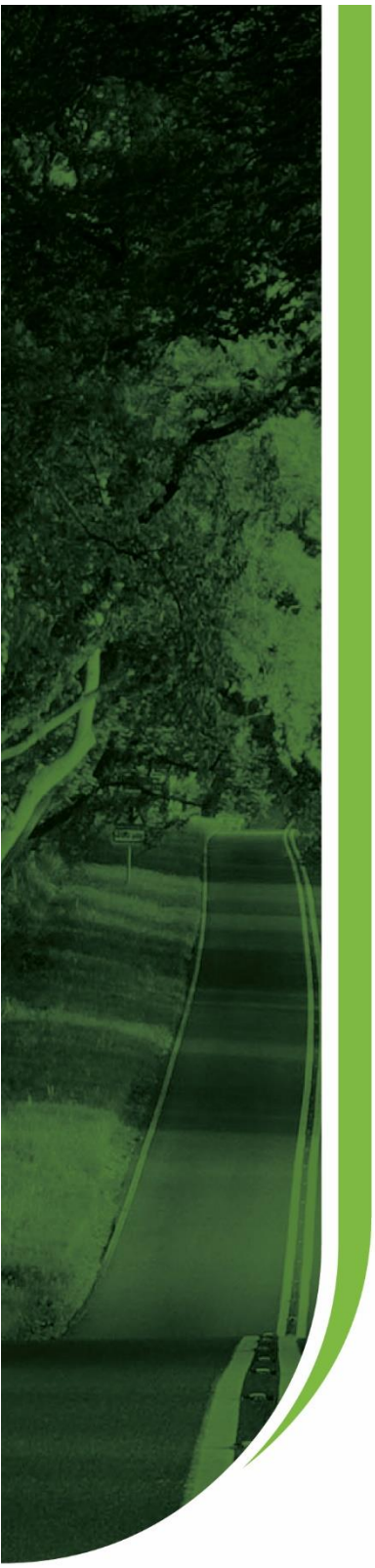

PROPOSED DEVELOPMENT OF A 165 MW PHOTOVOLTAIC SOLAR FARM ON PORTION 0 OF THE FARM KOPJE ALLEEN NO. 81 AND PORTION 1 OF THE FARM KOPJE ALLEEN NO. 81, KHAUTA NORTH SOLAR PV FACILITY, NEAR RIEBEECKSTAD, MATJHABENG LOCAL MUNICIPALITY, FREE STATE PROVINCE

Animal Species, Plant Species and Terrestrial Biodiversity Impact Assessment Report

October 2022

Prepared for:

WKN Windcurrent

Prepared by:
Megan Smith
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021 527 7084

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TABLES

1. Document control

1.1 Quality and revision record

1.1.1 Quality approval

	Capacity	Name	Signature	Date
Author:	Environmental Specialist (MSc Biological Sciences, UCT 2019)	Megan Smith		7/11/2022
Reviewer 2:	Ecologist (B.Sc Botany, NMU 2010) SACNASP Reg. no 400216/16	Roy de Kock		7/11/2022

This report has been prepared in accordance with Enviroworks Quality Management System.

1.1.2 Revision record

Revision Number	Objective	Change	Date
1	External Review	Formatting, grammar, recommendations	7/11/2022
2	Client review	Sentence construction, grammar, update of references	07/02/2023

2. Specialist details

2.1 Details of the specialist

This Botanical Impact Assessment was prepared and compiled by Megan Smith from Enviroworks. The sections below provide the details of the Specialist and explain their expertise to prepare this assessment.

Business name of Specialist:	Enviroworks
Specialist Name:	Megan Smith
EAPASA membership	2020/2855 (Candidate EAP)
IAIAsa registered:	No. 6459
South African Association of Botanists	No. 20711
Physical address:	Unit 81, Millennium Business Park, Edison Way, Century City, Western Cape
Postal address:	Suite 1064 Private Bag X2, Century City
Postal code:	7446
Telephone:	082 598 6500
E-mail:	Megan.smith@enviroworks.co.za

2.1.1 Expertise of the specialist

Megan Smith is an Environmental Specialist at Enviroworks. Her qualifications include a M.Sc. in Biological Sciences (UCT) and over two years' experience in the environmental field. Megan has a completed several Fynbos plant identification courses.

2.1.2 Statement of independence – specialist

I, Megan Smith, **ID 9412140124080**, declare that I:

- am an Environmental Specialist at Enviroworks.
- act as an independent Environmental Consultant.
- have compiled this Botanical, Faunal and Terrestrial Biodiversity Theme Impact Assessment report.
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.
- remuneration for services by the Proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal.
- the consultancy has no interest in secondary or downstream developments as a result of the outcome of this Impact Assessment Report.
- have no and will not engage in conflicting interests in the undertaking of the Activity.
- undertake to disclose to the Client and the Competent Authority any material, information that have or may have the potential to influence the decision of the Competent Authority required in terms of the Environmental Impact Assessment Regulations 2014, as amended.
- will provide the Client and Competent Authority with access to all information at my disposal, regarding this project, whether favourable or not.

Signature:

Megan Smith

2.3 Details of the review specialist

Business name of Specialist:	Blue Leaf Environmental
Specialist Name:	Roy de Kock
SACNASP	400216/16 (Pr.Sc. Nat)
Physical address:	31 Aster Avenue, Sunridge Park, Port Elizabeth, Eastern Cape, South Africa
Telephone:	+27 76 281 9660
E-mail:	roy@blueleafenviro.co.za

2.2.1 Expertise of the review specialist

Roy de Kock is an Ecological Specialist at Blue Leaf Environmental. His qualifications include a M.Sc. and over fifteen years' experience in the environmental field.

2.2.2 Statement of independence – specialist

I, Roy de Kock, **ID 7606 2205 3202 082**, declare that I:

- am an Environmental Specialist at Blue Leaf Environmental.
- act as an independent Environmental Consultant.
- have reviewed this Botanical, Faunal and Terrestrial Biodiversity Theme Impact Assessment report.
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference.
- remuneration for services by the Proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal.
- the consultancy has no interest in secondary or downstream developments as a result of the outcome of this Impact Assessment Report.
- have no and will not engage in conflicting interests in the undertaking of the Activity.
- undertake to disclose to the Client and the Competent Authority any material, information that have or may have the potential to influence the decision of the Competent Authority required in terms of the Environmental Impact Assessment Regulations 2014, as amended.
- will provide the Client and Competent Authority with access to all information at my disposal, regarding this project, whether favourable or not.

Signature:

Roy de Kock

3. Introduction

4.1 Project description

The Applicant, Khauta North Solar PV Facility RF (Pty) Ltd, proposes to establish a commercial photovoltaic (PV) energy facility (hereafter referred to as Khauta North SPV Facility) with an output capacity of 165 megawatt (MW). Based on a pre-feasibility analysis and environmental screening undertaken by Khauta North SPV Facility RF (Pty) Ltd, a favourable area has been identified for consideration, which will be verified through a Scoping and Environmental Impact Reporting (EIA) process.

The Khauta North SPV Facility and associated infrastructure are proposed to be located on Portion 0 of the Farm Kopje Alleen No. 81 and Portion 1 of the Farm Kopje Alleen No. 81, about 4km north-east of Riebheeckstad, within the Matjhabeng Local Municipality in the Free State Province. The facility is envisaged to have a maximum export capacity of 165 MW power to be achieved through several arrays of PV panels and the following associated infrastructure:

- PV modules and mounting structures (monofacial or bifacial) with fixed, single or double axis tracking mounting structures;
- Associated stormwater management infrastructure;
- Battery Energy Storage System (BESS);
- Site- and internal access roads (up to 6 m wide);
- Auxiliary buildings (offices, parking, etc.);
- Ablution facilities and associated infrastructure;
- Temporary laydown area during the construction phase (which will be a permanent laydown area for the BESS during the operational phase);
- On-site 33/132 kV substation (facility substation) and associated 33/132 kV collector transmission line;
- Grid connection infrastructure including medium-voltage cabling between the project components and the facility substation (underground cabling will be used where practical);
- Perimeter fencing; and,
- Rainwater and/or groundwater storage tanks and associated water transfer infrastructure.

The proposed Khauta North SPV Facility development requires a development footprint of approximately 273 ha and is located within the broader area of approximately 515 ha of the two farm portions. Therefore, the PV facility can be appropriately sited within the broader area such that any identified environmental sensitivities can be avoided.

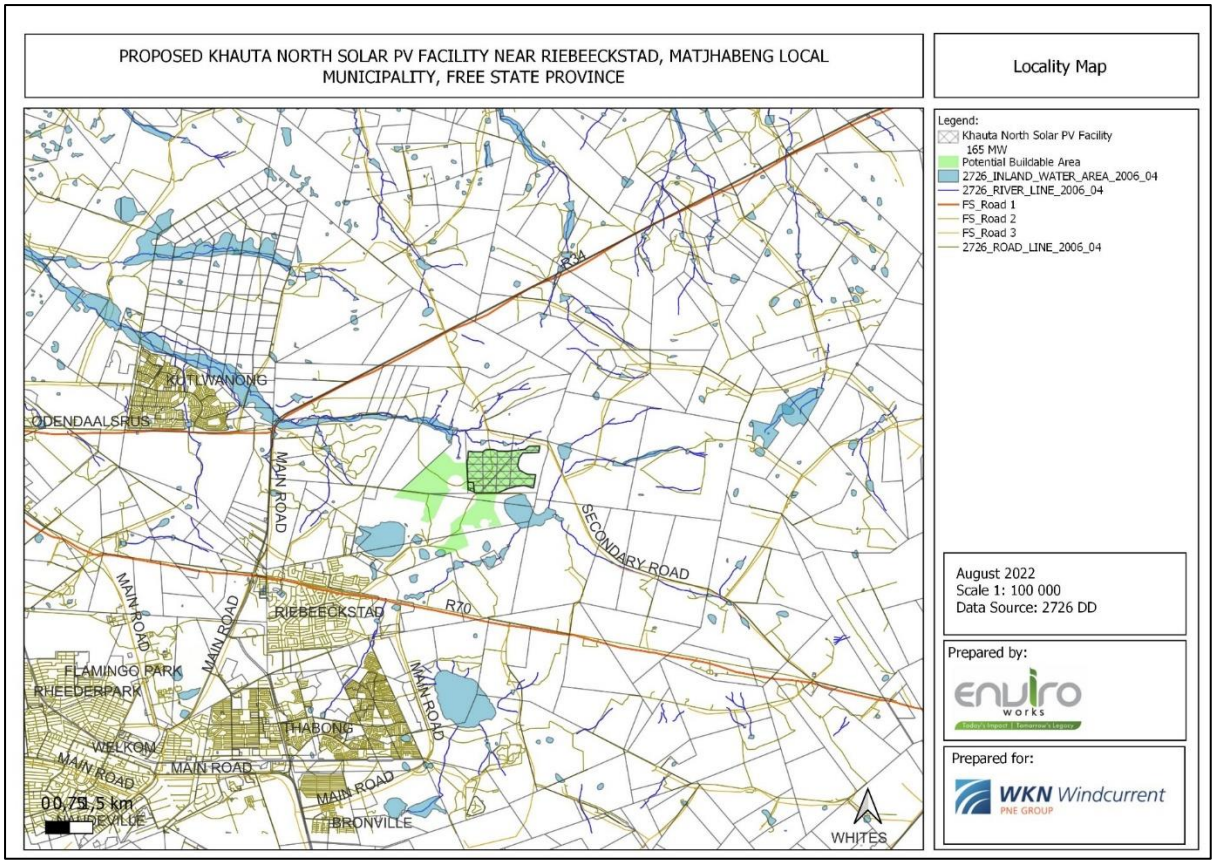

Figure 1 Locality map of the proposed development site (Scale: 1:10000)

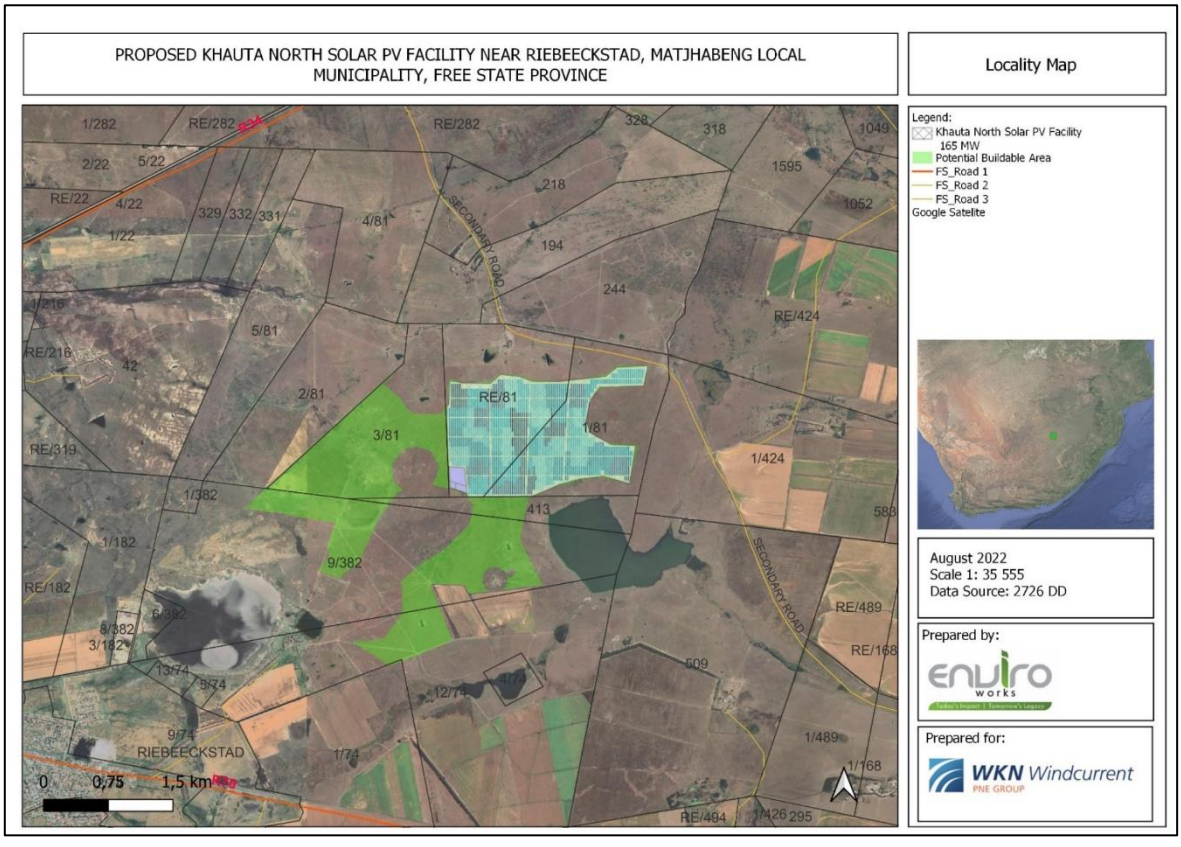

Figure 2 Locality map of the proposed development site and the development footprint of the 165 MW solar farm in relation to the total, larger, solar farm development footprint (Scale: 1:35 555)

3.2 Applicable legislation

With respect to the proposed Khauta North SPV Facility the following table summarises the potential listed activities, which the proposed development is likely to trigger, for which this Scoping Report and Application for Environmental Authorisation has been prepared.

Table 1: Listed Activities Likely to be Triggered by the Khauta North SPV Facility.

GNR 983 (as amended) Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
Activity No.11:	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	The proposal includes medium voltage (MV) cabling of up to 33/132 Kilovolts (kV) and an onsite substation with a capacity of up to 132 kV.
Activity No.12:	The development of— (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	The proposed Khauta North SPV Facility could trigger this activity, should access road development and/or expansion and supporting services infrastructure have a cumulative footprint exceeding 100 square meters within a watercourse or within 32m of a watercourse. The use of existing infrastructure and footprints will be preferred..
Activity No. 19.	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	Possible infilling and levelling of three small preferential water flow paths/drainage lines present within the central-northern

		portion of the Khauta North SPV Facility. Possible infilling or deposition of material into or from a watercourse and supporting services infrastructure, however, the use of existing infrastructure and footprints (existing farm roads) will be preferred.
Activity No.24:	The development of a road— (i) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (c) which is 1 kilometre or shorter.	The proposed main access road (existing farm road) to Khauta North SPV Facility could be up to 8m wide, but with the inclusion of side drains and gavel embankments, and will thus exceed the threshold of this activity.
Activity No. 28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The proposed Khauta North SPV Facility development is considered to be commercial use and the total footprint size will exceed 1 hectare (ha), on land that was used for agriculture/game farming.
Activity No. 56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or	The proposed main access road (existing farm road) to Khauta North SPV Facility may

	(ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	potentially be lengthened by more than 1km in order to reach Khauta North SPV Facility. This will occur outside and urban area.
GNR 984 **(as amended)** Activity No(s):	Provide the relevant **Scoping and EIA Activity(ies)** as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Activity No. 1:	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.	The proposed Khauta North SPV Facility will have a generation capacity of up to 165 megawatts (MW).
Activity No.4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	The applicant proposes to install a Battery Energy Storage System (BESS). The technology alternative under consideration includes: Solid State Batteries; or Redox Flow Batteries. Each BESS container, which consist of hazardous substances, will require an area of up to 4 ha and will be assessed through a risk assessment during the EIA phase. "Dangerous goods" that are likely to be associated with the project include fuel stored during the

		construction phase and/or hazardous chemical substances at the substation during the operational phase.
Activity No. 15:	The clearance of an area of 20 hectares or more of indigenous vegetation.	The proposed Khauta North SPV Facility will require the clearance of an area in excess of 20ha and as such exceeds the threshold of this activity. In order to accommodate the BESS and to remove potential fire hazards, approximately 4 ha of natural vegetation will be cleared.
Activity No(s): GNR 985 (**as amended)**	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Activity No. 2.	The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres. b. Free State (iii) Outside urban areas: (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;	Above-ground water storage tank with a capacity to store 3-4 days (± 700 m^3) of construction water will likely be required.

Activity No. 4.	The development of a road wider than 4 metres with a reserve less than 13,5 metres. b. Free State (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, excluding disturbed areas;	This activity may be applicable pending the final design considerations for the layout of project infrastructure and main access road.
Activity No. 10.	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. b. Free State (i) Outside urban areas: (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, excluding disturbed areas.	"Dangerous goods" that are likely to be associated with the project include fuel stored during the construction phase and/or hazardous chemical substances at the substation during the operational phase. Threshold of 80 m^3 expected to be exceeded. The proposed BESS will contain hazardous substances/toxic chemicals and/or liquid electrolyte which pose an environmental risk if leaked. The design of the BESS will take into account potential leaks and equipment will be suitably bunded and/or containerised and make provision for secondary

		containment to accommodate any spill as a result of normal operation and maintenance.
Activity No. 12.	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. b. Free State (ii) Within critical biodiversity areas identified in bioregional plans; (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	This activity may be applicable pending the final design considerations for the layout of project infrastructure and main access road.
Activity No. 14.	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; b. Free State (i) Outside urban areas: (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;	This activity may be applicable pending the final design considerations for the layout of project infrastructure and main access road.
Activity No. 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. b. Free State (ii) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or	This activity may be applicable pending the final design considerations for the layout of project infrastructure and main access road.

	from the core area of a biosphere reserve, excluding disturbed areas; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland;	

3.3 Objective

Various environmental legislation in South Africa makes provision for the protection of our natural resources and the functionality of ecological systems to ensure sustainability. Such acts include the National Environmental Management: Biodiversity Act (Act 10 of 2004), National Forests Act (Act 84 of 1998), Conservation of Agricultural Resources Act (Act 43 of 1983), National Water Act (Act 36 of 1998), framework legislation such as the NEMA and protocols such as the PROCEDURES FOR THE ASSESSMENT AND MINIMUM CRITERIA FOR REPORTING ON IDENTIFIED ENVIRONMENTAL THEMES IN TERMS OF SECTIONS 24(5)(a) AND (h) AND 44 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, WHEN APPLYING FOR ENVIRONMENTAL AUTHORISATION (GN No. 43110 of 20 March 2020).

The various components of ecological systems are all interrelated and it is therefore important that specialist studies of all such components be conducted prior to the commencement of any proposed project development. Only once the potential impacts and outcomes of proposed developments on the ecological systems of an area are understood, can informed decisions be made regarding the viability of projects to address and achieve the environmental and socio-economic needs of an area.

The solar farm could have potential impacts on the vegetation, fauna, and the surrounding environment. Vegetation will be displaced since the new development footprint will transform much of the surface area. To evaluate the level of acceptability of the impact on the natural environment a Plant Species, Animal Species, and Terrestrial Biodiversity Themes Impact Assessment was conducted. This was required to determine the potential presence of ecologically significant habitats and plant/animal species of conservation concern within the proposed project footprint. Proposed mitigation and management measures must also be recommended to attempt to reduce/alleviate the identified potential impacts.

This Impact Assessment included a vegetation and habitat survey to:

- Identify and list significant species encountered on the proposed project footprint and direct surrounds and list any protected and/or Red Data Listed species.
- Determine and discuss the condition and extent of degradation and/or transformation of the vegetation on the proposed project footprint.
- Verify the site conditions as described by Low (2014) and Becker (2019).
- Determine any potential habitats for any protected or threatened faunal species.
- Determine and discuss the ecological sensitivity and significance of the proposed project area.
- Identify, evaluate, and rate the potential impacts of the proposed project on the natural environment.

- Provide recommendations on mitigation and management measures to attempt to reduce/alleviate these identified potential impacts.

Documents or guidelines that were consulted to describe the vegetation and assess the impact of the proposed development include:

- Grassland Ecosystem Guidelines: Landscape interpretation for planners and managers (2013)(Cadman et al., 2013).
- South African Grassland Ecology and its Restoration (2013) (Zaloumis, 2013)
- The Conservation Status of Temperate Grasslands in southern Africa (2011)

3.4 Minimum Requirements – Screening Tool

The National Web based Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/) is a geographically based web-enabled application which allows a proponent intending to submit an application for Environmental Authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended to screen their proposed site for any environmental sensitivity.

The Screening Tool also provides site specific EIA process and review information, for example, the Screening Tool may identify if an industrial development zone, minimum information requirement, Environmental Management Framework or bio-regional plan applies to a specific area.

Further to this, the Screening Tool identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site.

Finally, the Screening Tool allows for the generating of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended whereby a Screening Report is required to accompany any application for Environmental Authorisation and as such the tool has been developed in a manner that is user friendly and no specific software or specialised GIS skills are required to operate this system.

PROCEDURES FOR THE ASSESSMENT AND MINIMUM CRITERIA FOR REPORTING ON IDENTIFIED ENVIRONMENTAL THEMES IN TERMS OF SECTIONS 24(5)(a) AND (h) AND 44 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, WHEN APPLYING FOR ENVIRONMENTAL AUTHORISATION have been gazetted (GN. R 320 of 20 March 2020). In terms of sections 24(5)(a), (h) and 44 of the National Environmental Management Act, 1998, these procedures prescribe general requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report content requirements of environmental impacts for environmental themes for activities requiring Environmental Authorisation, as contained in the Schedule therein. When the requirements of a protocol apply, the requirements of Appendix 6 of the Environmental Impact Assessment Regulations, as amended, (EIA Regulations), promulgated under

sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), are replaced by these requirements.

According to the report generated by the National Screening Tool the following three themes and their protocols will be applicable this study:

- *Terrestrial Biodiversity Theme*

  PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORTING CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY (GN 320, 2020)

- *Plant Species Theme*

  PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT SPECIES (GN 1150, 2020).

- *Animal Species Theme*

  PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL ANIMAL SPECIES (GN 1150, 2020)

3.4.1 Terrestrial Biodiversity Theme Results

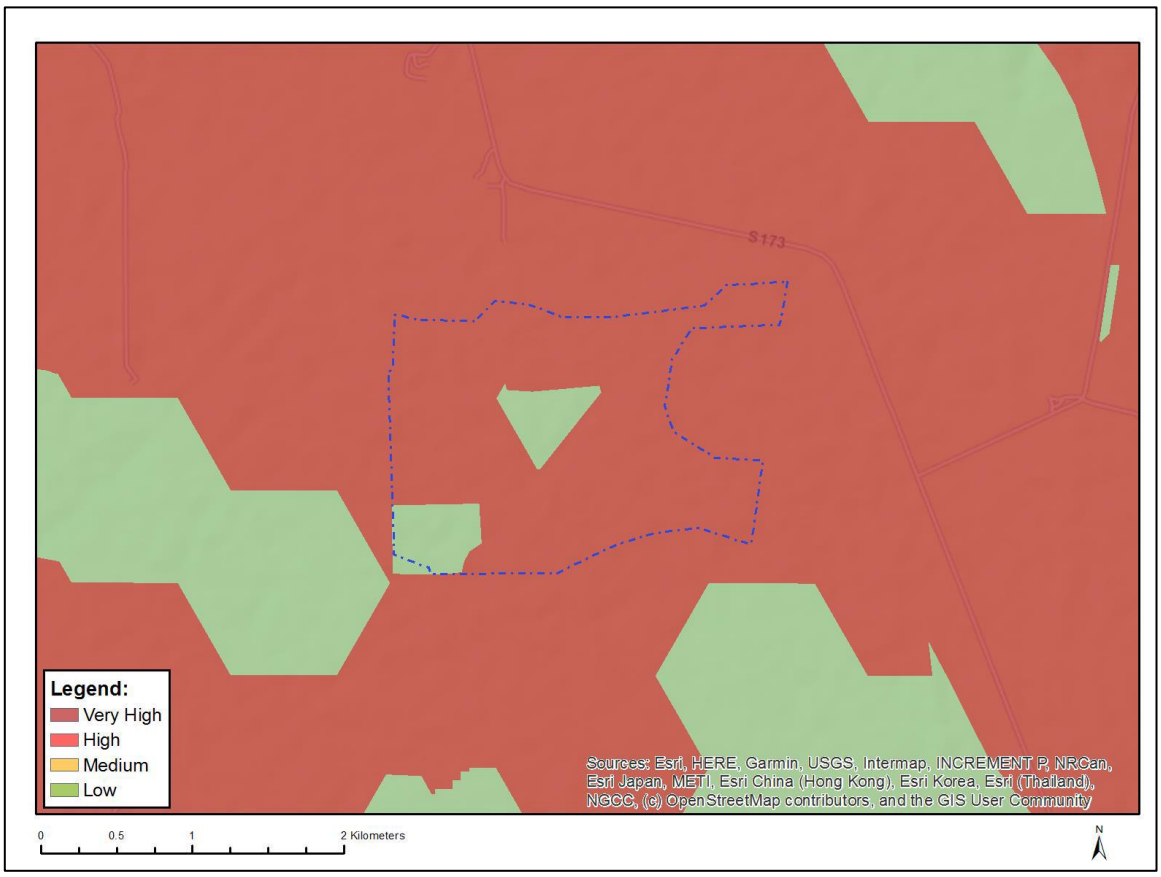

Figure 3 Terrestrial Biodiversity Theme based on the results from the National Screening Tool Report

Based on the initial Site Sensitivity Verification (Section 6.5) undertaken by the specialist on **18 and 19 January 2022,** the Terrestrial Biodiversity Theme sensitivity was confirmed to be of "Low" rather than "Very High" as identified by the screening tool in Figure 3. The protocols further specify that the content of the assessment and minimum report content requirements on terrestrial biodiversity. The requirements are listed in the table below. The relevant section of this report is linked to each of the protocol's minimum requirements.

Table 2 Content cross-reference checklist for specialist assessment and minimum report content requirements for Terrestrial Biodiversity Compliance Statement Report as per GN R 320, with corresponding section names in the report.

Requirement	Section of this report
contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	Details of the specialist and review specialist
a signed statement of independence by the specialist	Statement of independence - specialist
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Date and season of site visit
a baseline profile description of biodiversity and ecosystems of the site;	General Vegetation Description; Sensitive Areas
the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modelling used, where relevant;	Methodology
in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase	N/A
where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMP	Overall Impact Assessment
a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	Assumptions, uncertainties, and gaps in knowledge
any conditions to which the compliance statement is subjected.	Risk ratings and potential impacts

3.4.2 Plant Species Theme Results

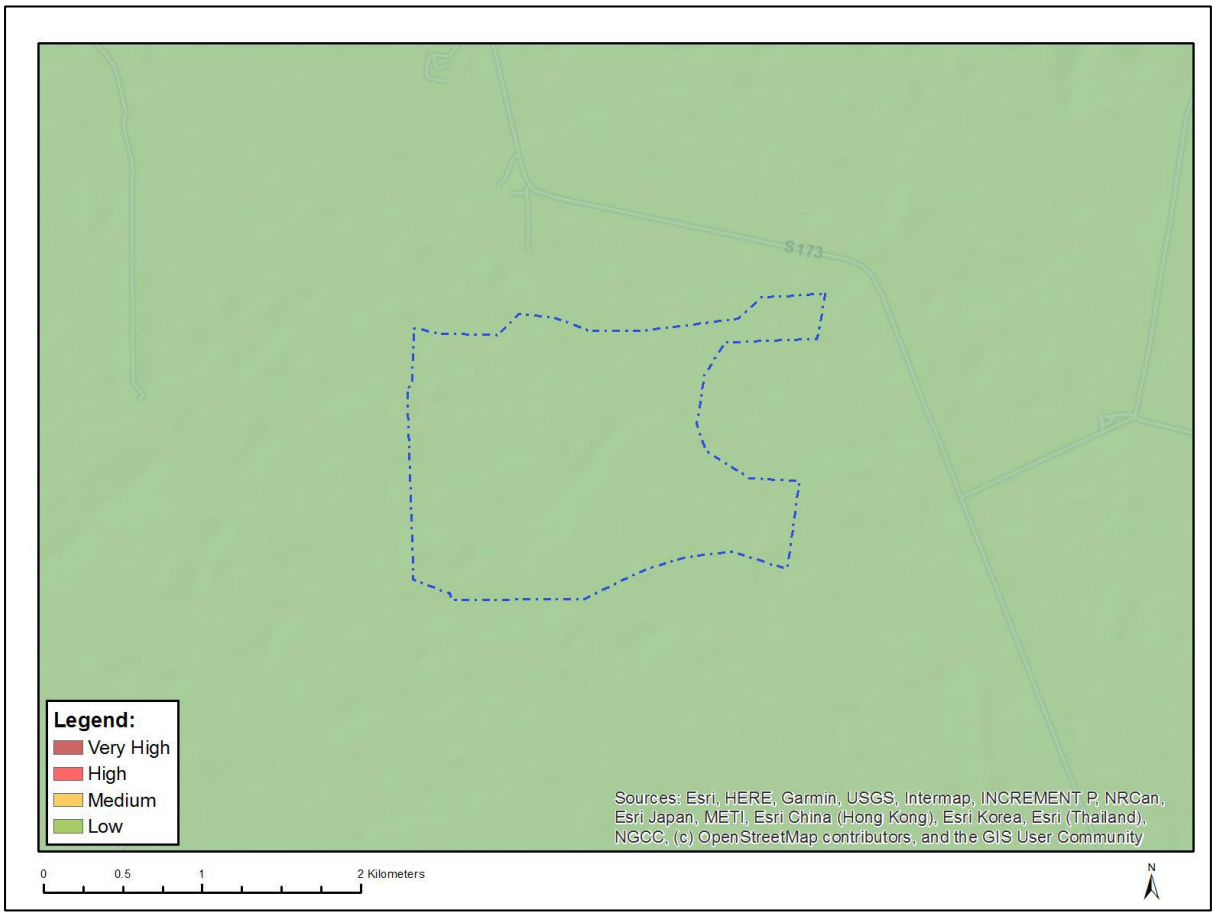

Figure 4 Plant Species Theme based on the results from the National Screening Tool Report

Based on the initial Site Sensitivity Verification (Section 6.5) undertaken by the specialist on **17 and 19 January 2022**, the Plant Species Theme sensitivity was confirmed to be of "Low" sensitivity as identified by the screening tool in Figure 4. The protocols further specify that the content of the assessment and minimum report content requirements on the Plant Species Theme. The requirements are listed in the table below. The relevant section of this report is linked to each of the protocol's minimum requirements

Table 3 Content cross-reference checklist for specialist assessment and minimum report content requirements for Plant Species Theme Compliance Statement Report as per GN R 1150, with corresponding section names in the report.

Requirement	Section of this report
contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	Details of the specialist and review specialist
a signed statement of independence by the specialist	Statement of independence - specialist
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Date and season of site visit
A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Methodology
A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a	Assumptions, uncertainties, and gaps in knowledge

Requirement	Section of this report
statement of the timing and intensity of site inspection observations	
a description of the mean density of observations/number of samples sites per unit area of site inspection observations	Methodology
where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMP	Overall Impact Assessment
a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	Assumptions, uncertainties, and gaps in knowledge
any conditions to which the compliance statement is subjected.	Risk ratings and potential impacts

During the site verification the proposed development was surveyed, and all species encountered were recorded to detect any species of conservation concern (See Section 6.4.4).

3.4.3 Animal Species Theme Results

Figure 5 Animal Species Theme based on the results from the National Screening Tool Report

Based on the initial Site Sensitivity Verification (Section 6.5) undertaken by the specialist on **9 March 2022 and follow up site inspection of the faunal taxon specialist (for *Smaug giganteus*) for the on 30 April 2022 and 1 May 2022 (Appendix D)**, the Animal Species Theme sensitivity was confirmed to be of "Medium" sensitivity

rather than “Low” sensitivity as identified by the screening tool in Figure 5. Based on the aforementioned, a full impact assessment will be necessary to assess the impacts of the proposed sand mine on the Animal Species Theme.

The protocols further specify that the content of minimum report content requirements on terrestrial animal species. The requirements are listed in the table below. The relevant section of this report is linked to each of the protocol’s minimum requirements.

Table 4 Content cross-reference checklist for specialist assessment and minimum report content requirements for Animal Species Theme Impact Assessment as per GN R 1150, with corresponding section names in the report.

Requirement	Section of this report
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Details of the specialist and review specialist; Appendix D
A signed statement of independence by the specialist;	Statement of independence - specialist
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Date and season of site visit
A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Methodology
a description of the mean density of observations/number of sample sites per unit area12 and the site inspection observations	Appendix D
a description of the assumptions made and any uncertainties or gaps in knowledge or data	Assumptions, uncertainties, and gaps in knowledge
details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Appendix D; Species of Conservation Concern
the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area	N/A – only suitable habitat was recorded
the location of areas not suitable for development and to be avoided during construction where relevant	Appendix D; Species of Conservation Concern
a discussion on the cumulative impacts	Risk ratings and potential impacts
Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Risk ratings and potential impacts, Overall Impact Assessment, Recommendations
a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant	Site verification and site condition; Conclusion
a motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate	Species of Conservation Concern

4. Methodology

4.1 Land cover, climate, and soils and geology

- Information related to land cover of the development was based on the available literature and the latest GIS data available from the Department of Environmental Affairs (Department of Environmental Affairs, 2018).
- Climate data was extracted from available literature and latest GIS data available.
- Information related to the classified Soils and Geology within the development site was based on available literature and the Environmental Potential Atlases (Department of Environmental Affairs and Tourism and University of Pretoria, 1995).

4.2 Botanical, Faunal and Terrestrial Impact Assessment

4.3.2 Vegetation and Fauna

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford, 2006), the 2018 National Biodiversity Assessment Synthesis Report (South African National Biodiversity Institute (SANBI), 2019) and the National List of Ecosystems that are Threatened and in Need of Protection (GN 1002 of 9 December 2012).
- A brief discussion on the vegetation type in which the study area is situated, using available literature, in order to place the study in context.
- A broad-scale map was generated of the vegetation and habitat sensitivity of the site using available GIS data and the DFFE Screening Tool.
- A list of endemic taxon species know to occur in the area was investigated prior to the site visit (Mucina and Rutherford, 2006).
- Sightings from the area and surrounds extracted from the Global Biodiversity Information Facility and iNaturalist (“Global Biodiversity Information Facility,” n.d.; “iNaturalist,” n.d.), and the IUCN data base (“IUCN 2020,” n.d.).
- Species and their Red Data Listing and Protected Status, occurring or expected to occur within the area were obtained from:
    - The DFFE Screening Tool,
    - Red List of South African Plants (Nick and Raimondo, 2007; South African National Biodiversity Institute (SANBI), 2016),
    - Nature Conservation Ordinance (No. 19 of 1969),
    - IUCN (“IUCN 2020,” n.d.),
    - National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004): Critically Endangered, Endangered, Vulnerable, and Protected Species List (2007, as amended),
    - Virtual databases to determine potential faunal species that may inhabit the site:

  - Atlas of African Lepidoptera
  - Southern African Bird Atlas Project 2
  - Reptile Atlas of Africa
  - Atlas of African Spiders
  - Atlas of African Scorpions
  - Frog Atlas of southern Africa
  - Virtual Museum of African Mammals,
- List of plant and faunal species recorded during the survey. Plants and animals were identified from photographs and specimens taken on site, and
- Note that avifauna have been excluded from this assessment.

4.3.3 Sensitive areas

The Free State Spatial Biodiversity Plan (Collins, 2016) was used to identify Critically Biodiverse Areas (Categories 1 and 2) and Ecological Support Areas (Categories 1 and 2) within the proposed development footprint, the proposed development property, and surrounding areas. The extent of the sensitive areas was mapped using the latest available GIS data.

4.3.4 Date and season of site visit

A site visit took place on 18 and 19 January 2022 to assess site for the proposed solar farm development. Sections of the development site were systematically chosen to be sampled. A walkthrough was done of each section, assessing environmental conditions and pictures were taken of the environment and plant species. The weather conditions were accommodating, where clear visibility facilitated the inspection of the facility and surrounding vegetation. January is an appropriate time to conduct botanical surveys within grasslands given that January to March is when most of the species are flowering (https://www.southafrica.net/gl/en/travel/article/grassland-wildflowers-catch-the-early-and-late-bloomers-around-the-drakensberg).

A follow up site inspection was conducted by a faunal taxon specialist, an expert in the biology and ecology of the Giant Girdled Lizard (*Smaug giganteus*), on 30 April and 1 May 2022 to determine if any individuals are currently inhabiting the development footprint and to identify suitable habitat for the species. This survey was done because the Critical Biodiverse Area delineation was identified by possible habitat for the species.

4.3.5 Impacts and rating methodology

Potential impacts of the proposed project on the surrounding natural environment were identified, evaluated and rated as per the methodology described below:

The **Present Ecological State (PES)** of the proposed project area was assessed and rated as per Table 5 below. The Present Ecological State (PES) refers to the current state or condition of an area in terms of all its

characteristics and reflects the change to the area from its reference condition. The value gives an indication of the alterations that have occurred in the ecosystem.

Table 5 Criteria for PES calculations.

Ecological Category	Score	Description
A	> 90-100%	**Unmodified**, natural.
B	> 80-90%	**Largely natural** with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	> 60-80%	**Moderately modified**. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	> 40-60%	**Largely modified**. A large loss of natural habitat, biota and basic ecosystem functions has occurred
E	> 20-40%	**Seriously modified**. The loss of natural habitat, biota and basic ecosystem functions is extensive
F	0-20%	**Critically/Extremely modified**. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

The **Ecological Importance and Sensitivity (EIS)** of the proposed project area was assessed and rated as per Table 6 below.

The Ecological Importance and Sensitivity (EIS) of an area is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales, and both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.

Table 6 Criteria for EIS calculations.

EIS Category	Score	Description
Low/Marginal	D	Not ecologically important and sensitive at any scale. Biodiversity ubiquitous and not sensitive to flow and habitat modifications
Moderate	C	Ecologically important and sensitive on provincial/local scale. Biodiversity not usually sensitive to flow and habitat modifications
High	B	Ecologically important and sensitive. Biodiversity may be sensitive to flow and habitat modifications.
Very High	A	Ecologically important and sensitive. On national even international level. Biodiversity usually very sensitive to flow and habitat modifications.

The tables below indicate and explain the methodology and criteria used for the evaluation of the Environmental **Risk Ratings** as well as the calculation of the final **Environmental Significance Ratings** of the identified potential ecological impacts

Each potential environmental impact is scored for each of the Evaluation Components as per the Table 7 below.

Table 7 Scale utilised for the evaluation of the Environmental Risk Ratings.

Evaluation component	Ranking scale and description (criteria)
MAGNITUDE of negative impact (at the indicated spatial scale)	10 - Very high: Bio-physical and/or social functions and/or processes might be *severely* altered. 8 - High: Bio-physical and/or social functions and/or processes might be *considerably* altered. 6 - Medium: Bio-physical and/or social functions and/or processes might be *notably* altered. 4 - Low : Bio-physical and/or social functions and/or processes might be *slightly* altered.

Evaluation component	Ranking scale and description (criteria)
	2 - Very Low: Bio-physical and/or social functions and/or processes might be *negligibly* altered. 0 - Zero: Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	10 - Very high (positive): Bio-physical and/or social functions and/or processes might be *substantially* enhanced. 8 - High (positive): Bio-physical and/or social functions and/or processes might be *considerably* enhanced. 6 - Medium (positive): Bio-physical and/or social functions and/or processes might be *notably* enhanced. 4 - Low (positive): Bio-physical and/or social functions and/or processes might be *slightly* enhanced. 2 - Very Low (positive): Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. 0 - Zero (positive): Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	5 - Permanent 4 - Long term: Impact ceases after operational phase/life of the activity > 60 years. 3 - Medium term: Impact might occur during the operational phase/life of the activity – 60 years. 2 - Short term: Impact might occur during the construction phase - < 3 years. 1 - Immediate
EXTENT (or spatial scale/influence of impact)	5 - International: Beyond National boundaries. 4 - National: Beyond Provincial boundaries and within National boundaries. 3 - Regional: Beyond 5 km of the proposed development and within Provincial boundaries. 2 - Local: Within 5 km of the proposed development. 1 - Site-specific: On site or within 100 m of the site boundary. 0 - None
IRREPLACEABLE loss of resources	5 – Definite loss of irreplaceable resources. 4 – High potential for loss of irreplaceable resources. 3 – Moderate potential for loss of irreplaceable resources. 2 – Low potential for loss of irreplaceable resources. 1 – Very low potential for loss of irreplaceable resources. 0 - None
REVERSIBILITY of impact	5 – Impact cannot be reversed. 4 – Low potential that impact might be reversed. 3 – Moderate potential that impact might be reversed. 2 – High potential that impact might be reversed. 1 – Impact will be reversible. 0 – No impact.
PROBABILITY (of occurrence)	5 - Definite: >95% chance of the potential impact occurring. 4 - High probability: 75% - 95% chance of the potential impact occurring. 3 - Medium probability: 25% - 75% chance of the potential impact occurring 2 - Low probability: 5% - 25% chance of the potential impact occurring. 1 - Improbable: <5% chance of the potential impact occurring.
CUMULATIVE impacts	High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. Low: The activity is localised and might have a negligible cumulative impact. None: No cumulative impact on the environment.

Once the **Environmental Risk Ratings** have been evaluated for each potential ecological impact, the **Significance Score** of each potential ecological impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum **Significance Score** value is 150.

The **Significance Score** is then used to rate the **Environmental Significance** of each potential ecological impact as per Table 8 below. The **Environmental Significance** rating process is completed for all identified potential ecological impacts both before and after implementation of the recommended mitigation measures.

Table 8 Scale used for the evaluation of the Environmental Significance Ratings.

Significance Points	Environmental Significance	Description
125 – 150	**Very high (VH)**	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	**Medium-high (MH)**	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	**Medium (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

5. Assumptions, uncertainties and gaps in knowledge

5.1 Assumptions and uncertainties

The processes of investigation which have led to the production of this report, harbours several assumptions, which include the following:

- All information provided by the applicant to the environmental specialist was correct and valid at the time that it was provided.
- Note that avifauna have been excluded from this assessment.
- The proposed project development footprint as provided by the applicant is correct and will not be significantly deviated from.
- Strategic level investigations undertaken by the applicant prior to the commencement of the EIA process, determined that the development site represents a potentially suitable and technically acceptable location.

- The public will receive a fair and reoccurring opportunity to participate and comment during the EIA application process, through the provision of adequate public participation timeframes stipulated in the EIA Regulations (2014, as amended).
- The need and desirability of the project is based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints.
- The EIA application process is a project-level framework, and the specialists are limited to assessing the anticipated environmental impacts associated with the operational phases of the proposed project.
- Strategic level decision making is conducted through cooperative governance principles with the consideration of sustainable and responsible development principles underpinning all decision making.

Given that an EA application process involves prediction, uncertainty forms an integral part of the process. Two types of uncertainty are associated with the EA application process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as final certainty will only be obtained upon implementation of the proposed development. Adequate research, experience and expertise may minimise this uncertainty.
- Uncertainty of values depicts the approach assumed during the MP application process, while final certainty will be determined at the time of decision making. Enhanced communication and widespread/comprehensive coordination can lower uncertainty.
- Uncertainty of related decision relates to the interpretation and decision-making aspect of the MP application process, which shall be appeased once monitoring of the project phases is undertaken.
- The significance/importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the interpretation of results and limit the occurrence and scale of uncertainty.
- The initial study was undertaken as a desktop assessment and as such, the information gathered must be considered with caution, as inaccuracies and data capturing errors are often present within these databases.
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the relevant areas will need to be surveyed and pegged according to surveying principles.
- The risk assessment was applied on the basis that the stipulated mitigation measures in all specialist recommendations will be implemented as recommended and therefore the results presented demonstrate the impact significance of perceived impacts on the receiving environment post mitigation.

5.2 Gaps in the knowledge

The observations and findings made during the site inspection were during a specific time frame and the condition of the proposed site may vary throughout the year. Therefore, circumstances throughout the year may differ and deliver different results. Nevertheless, the site was surveyed during a time where most species in the area are flowering (January -March) and it is expected that most of the species were identified as accurately as possible and where visible during the inspection.

6. Results

6.1 Land cover

The proposed development is located on natural grasslands, approximately 4 km from the urban edge of Riebeeckstad. All the lands across the project area are now used only for grazing. These lands are likely to have been cropped with economic viability in the past, but they have been abandoned as cropland because they were found to be too marginal for viable crop production as the agricultural economy became more challenging, particularly in terms of high input costs (Dr Johann Lanz, 2022).

There are several mining operations surrounding Welkom, which lie to the south and the east of the proposed solar PV development. The nearest mine shaft is located approximately 7 km from the Khauta SPV Cluster. A land cover map of the proposed development footprint and surrounds is presented in Figure 6.

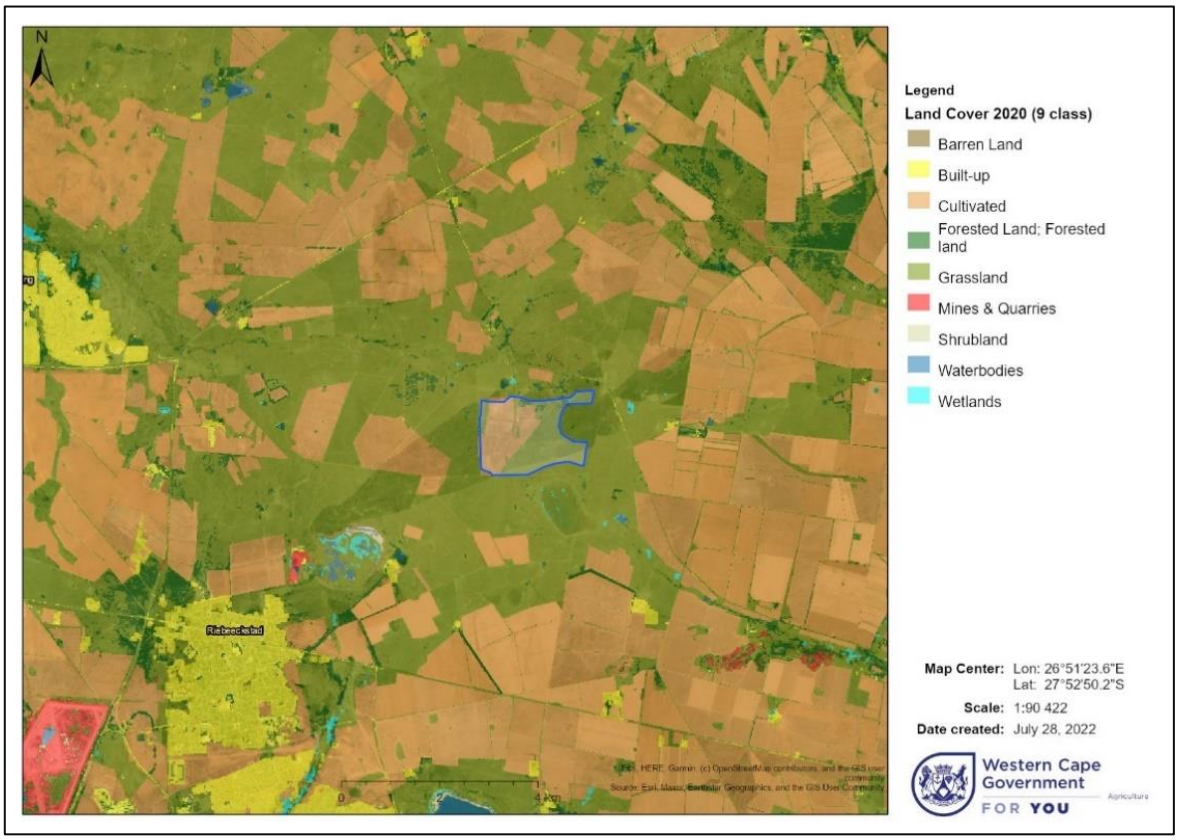

Figure 6 Landcover map for the proposed development footprint (demarcated in blue)

6.2 Climate

Riebeeckstad has a mid-latitude steppe climate (Classification: BSk), with rainfall peaking during the summer months. The mean annual precipitation (MAP) of the area is approximately 577 mm. Precipitation is highest in January (± 97 mm) and lowest in July (± 7 mm). The maximum average monthly temperature is approximately 23.3°C in the summer months while the minimum average monthly temperature is approximately 9.7°C during the winter. Maximum daily temperatures can reach up to 29.7°C in the summer months and dip to as low as 2.4°C during the winter (www.climate-data.org).

6.3 Soils and Geology

The development area is mainly covered by deep, sandy and clay, alluvial soils developed over quaternary alluvial sediments. Both alluvial and residual soil layers are expected to comprise high clay contents and highly expansive clay minerals (Mucina and Rutherford 2006).

The Agricultural assessment and site sensitivity verification report compiled by Dr Johann Lanz (2022) characterised the land type across the site as having high proportions of shallow, clay soils of the Sterkspruit and Valsrivier soil forms. The on-site soil investigation confirmed the dominance of these shallow, clay-rich soils across the site. The area is not suitable for crop production as the area is constrained by the shallow depth above the limiting dense clay horizon in the subsoil.

6.4 Botanical, Faunal and Terrestrial Impact Assessment

6.4.1 General Vegetation description

The proposed development site (demarcated in blue) consists of Highveld Alluvial Vegetation (Figure 7).

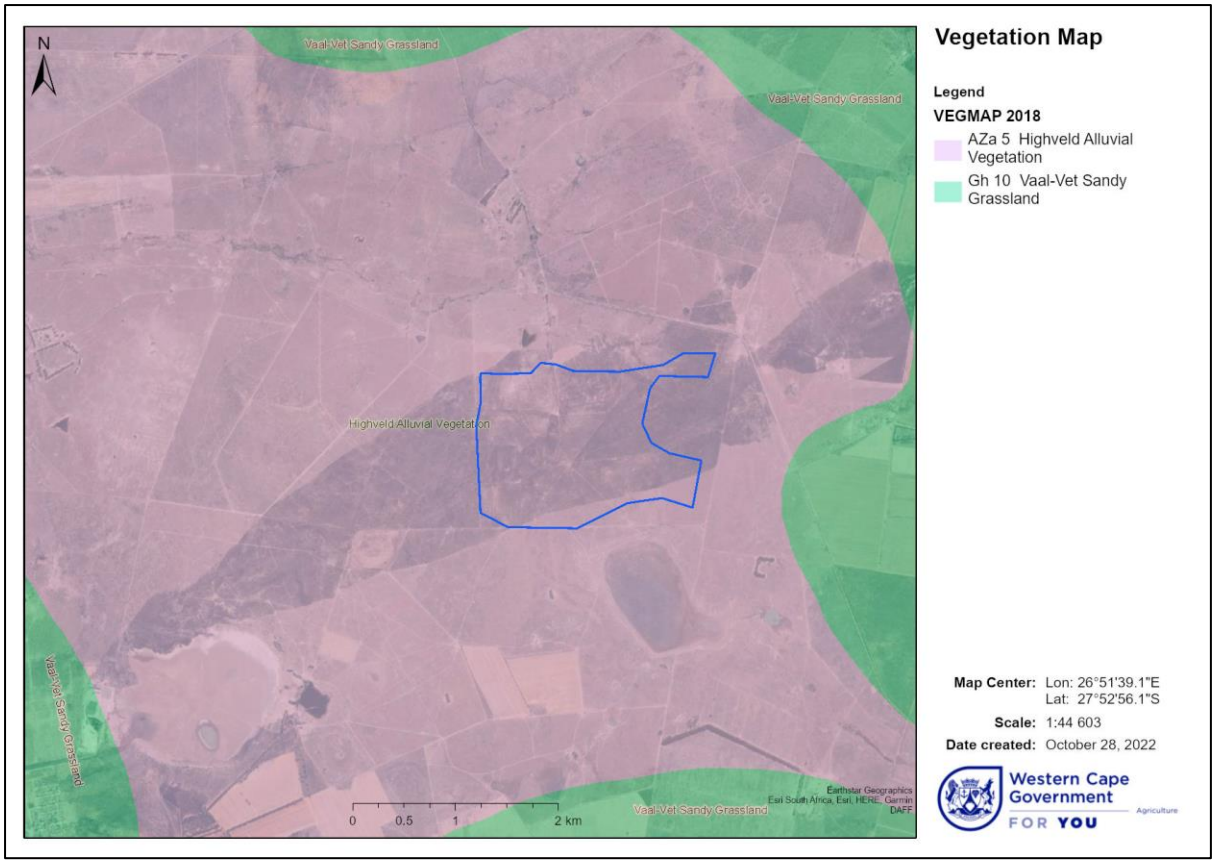

Figure 7 Vegetation types within the proposed development site (demarcated in blue)

Highveld Alluvial Vegetation can be found throughout South Africa in the Free State, Gauteng, North West and outside of South African in Lesotho and Swaziland. The vegetation type is often found along alluvial drainage lines and floodplains in the Grassland and Savanna Biome.

The vegetation within the Highveld Alluvial Vegetation is characterised by flat topography supporting riparian thickets mostly dominated by *Vachellia karroo*, accompanied by seasonally flooded grassland and disturbed herblands often dominated by alien plants (Mucina and Rutherford, 2006). Table 9 below presents the key indicator species of this vegetation type.

Table 9 Key indicator floral species associated with the Highveld Alluvial Vegetation type

Grass species	Forb species	Tree/Shrub species
Riparian thickets		
• *Setaria verticillata* • *Panicum maximum*	• *Pollichia campestris*	• *Vachellia karroo* • *Salix mucronata subsp. mucronata* • *S. mucronata subsp. woodii* • *Ziziphus mucronata* • *Celtis africana*

		• *Rhus lancea* *Gymnosporia buxifolia* • *Rhus pyroides* • *Diospyros lycioides* • *Ehretia rigida* • *Grewia flava* • *Asparagus laricinus suaveolens* • *Clematis brachiate* • *Lycium hirsutum*
Flooded grasslands & herblands		
• *Agrostis lachnantha* • *Andropogon eucomus* • *Chloris virgata* • *Cynodon dactylon* • *Eragrostis plana* • *Hemarthria altissima* • *Imperata cylindrical* • *Ischaemum fasciculatum* • *Miscanthus junceus* • *Paspalum distichum* • *Andropogon appendiculatus* • *Brachiaria marlothii* • *Cyperus denudatus* • *C. longus* • *Echinochloa holubii* • *Eragrostis obtuse* • *E. porosa* • *Fimbristylis ferruginea* • *Panicum coloratum* • *Pycreus mundii* • *Sporobolus africanus* • *S. fimbriatus* • *Themeda triandra* • *Urochloa panicoides*	• *Persicaria lapathifolia* • *Alternanthera sessilis* • *Barleria acrostegia* • *Corchorus asplenifolius* • *Equisetum ramosissimum* • *Galium capense* • *Hibiscus pusillus* • *Lobelia angolensis* • *Nidorella resedifolia* • *Persicaria amphibia* • *P. hystricula* • *Pseudognaphalium oligandrum* • *Pulicaria scabra* • *Rorippa fluviatilis var. fluviatilis* • *Senecio inornatus* • *Stachys hyssopoides* • *Vahlia capensis* • *Crinum bulbispermum* • *Haplocarpa lyrata*	• *Gomphocarpus fruticosus* • *Felicia muricata* • *Salsola rabieana*

Although the Highveld Alluvial Vegetation is classified as Least Concern, more than a quarter of the vegetation type has been transformed or lost as a result of cultivation, dam building, and the invasion of alien invasive plant species. Only 10% of the vegetation type is formally conserved.

6.4.2 Sensitive areas

The proposed development footprint is predominantly situated in an Ecological Support Area (ESA) and some portion of the proposed footprint is in Degraded Areas (Figure 8).

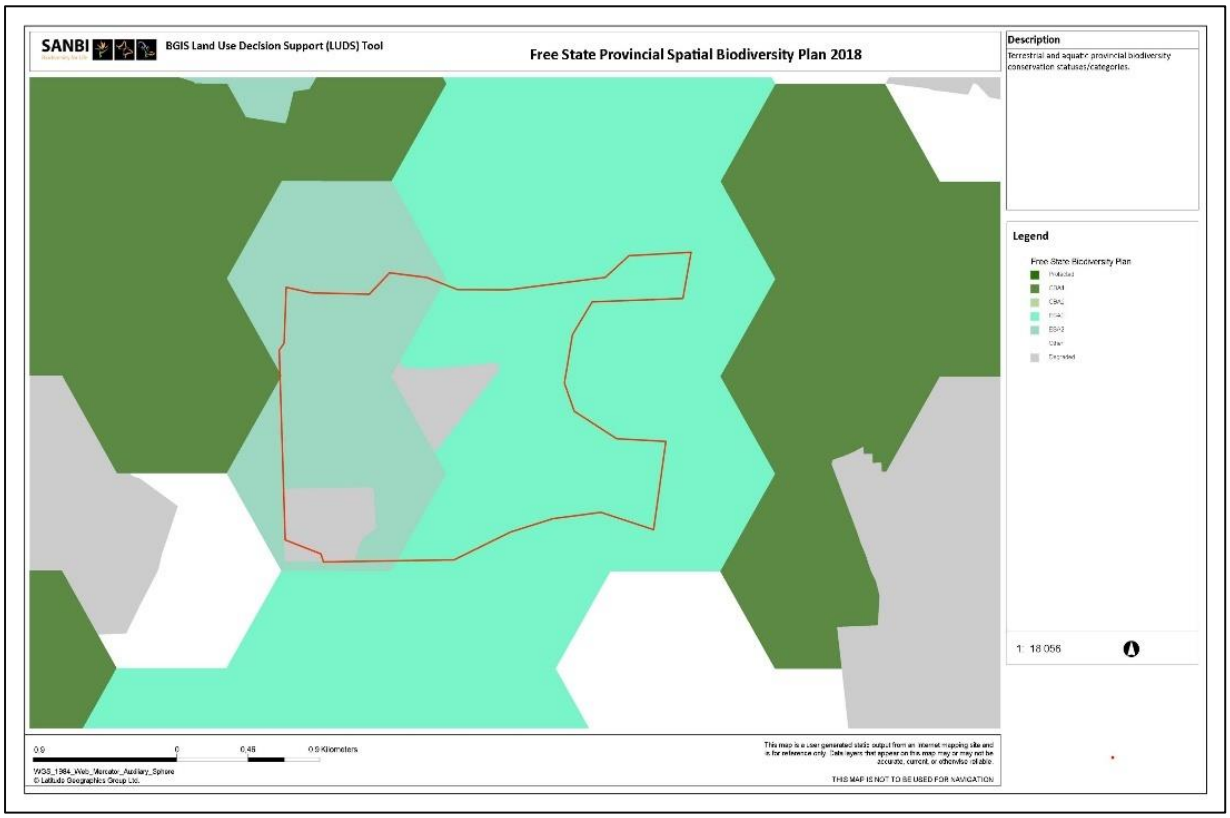

Figure 8 Sensitivity of the proposed development footprint (demarcated in red) where dark green = CBA 1, faded green = ESA 2, Blue/green = ESA 1, grey = degraded.

CBAs are areas of high biodiversity and ecological value. These areas are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. CBAs that are likely to be in a natural condition are classified as Category 1 CBAs and those that are potentially degraded or represent secondary vegetation are classified as Category 2 CBAs. Only low-impact, biodiversity-sensitive land uses are considered appropriate within CBAs (Pool-Stanvliet et al., 2017). These areas are also to be managed for biodiversity conservation purposes, restored where required and incorporated into the Protected Area network.

Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas (CBAs) and delivering ecosystem services. ESAs are supporting zones which must be safeguarded to prevent degradation of CBAs and formal protected areas.

Since the proposed development footprint is situated in sensitive areas identified by the Free State Biodiversity Spatial Plan, the development footprint is considered to hold conservation importance within these sensitive areas. To determine whether the proposed development footprint is verified to carry out the functions of the ESA and CBA as mapped, it must first be determined the reason for the ESA and CBA delineation.

The ESA has been classified due to the presence and functioning of watercourses. Therefore, by avoiding the watercourses and their buffers (as delineated by the Aquatic Biodiversity Verification Report; EcoFocus, 2022) , the functioning of the ESA will be preserved.

All delineated watercourses, considered to be ecologically significant in the Aquatic Biodiversity Assessment Report, and their buffer areas are identified as no-go areas. This would be especially significant in all areas delineated as ESA. Given that the ESA has been delineated to preserve the NFEPA wetland clusters, any areas that would prevent sedimentation (i.e., reduction of water quality) into the wetlands must be preserved. This will retain the functionality of the ESA.

The CBA has been classified as being important suitable habitat for the threatened species, Smaug giganteus. Therefore, areas that are of suitable habitat for the aforementioned species will be considered to be included in the CBA delineation.

Verification of the ESA and CBA and the state thereof is discussed in Section 6.4. Detailed recommendations and measures to mitigate impacts in the sensitive areas are stipulated in Section 7 and 9.

6.4.3 Site Assessment

6.4.3.1 Vegetation description

Based on the site inspection (see verification report in Appendix C), the overall development footprint can be verified to be mixture of mostly natural terrestrial areas interspersed with old lands and areas associated with wetlands (Figure 9) on a mostly flat topography with slightly undulating hills. Based on satellite imagery, the old lands were left to passively rehabilitate less than 10 years ago. The properties are currently being used for cattle and game farming. However, grazing intensity is expected to be low based on the high diversity of indigenous plants.

With specific reference to the 165 MW facility development footprint, it was confirmed that the area predominantly inhabits areas of natural grassland and old lands. See Sections 6.4.3.1.2 for a description of the natural grassland and old lands.

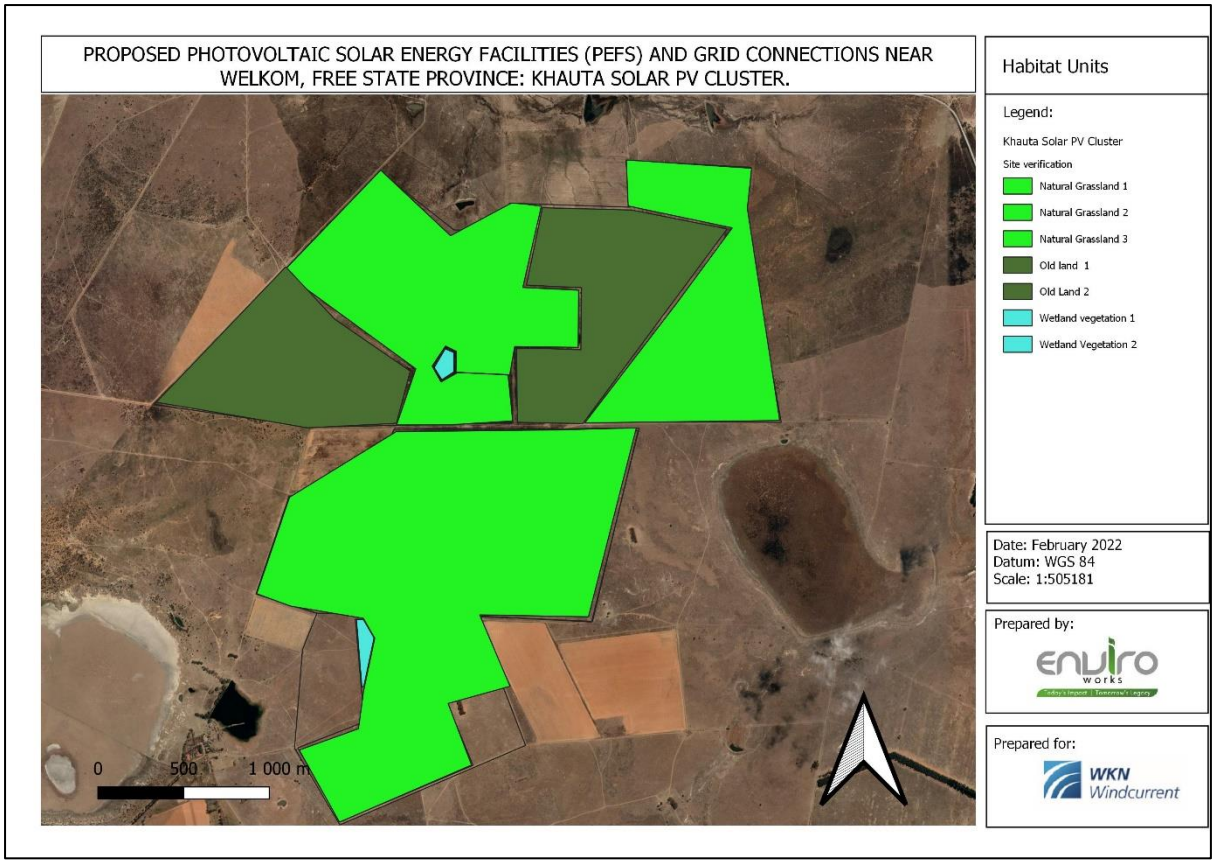

Figure 9 Habitat Units within the Solar Photovoltaic (PV) total development footprint

6.4.3.1.1 Old Lands

The old lands were verified to be rehabilitating or “secondary” grassland (transformed from natural grassland as per Section 6.4.3.1.2) that are less than 10 years old. These areas are not considered “natural vegetation” as per the National Environmental Management Act (Act 107 of 1998). These old lands have undergone significant transformation in the last 10 years (See Figure 10) due to crop cultivation which is often a source of grassland transformation in the Free State Province (Cadman et al., 2013).

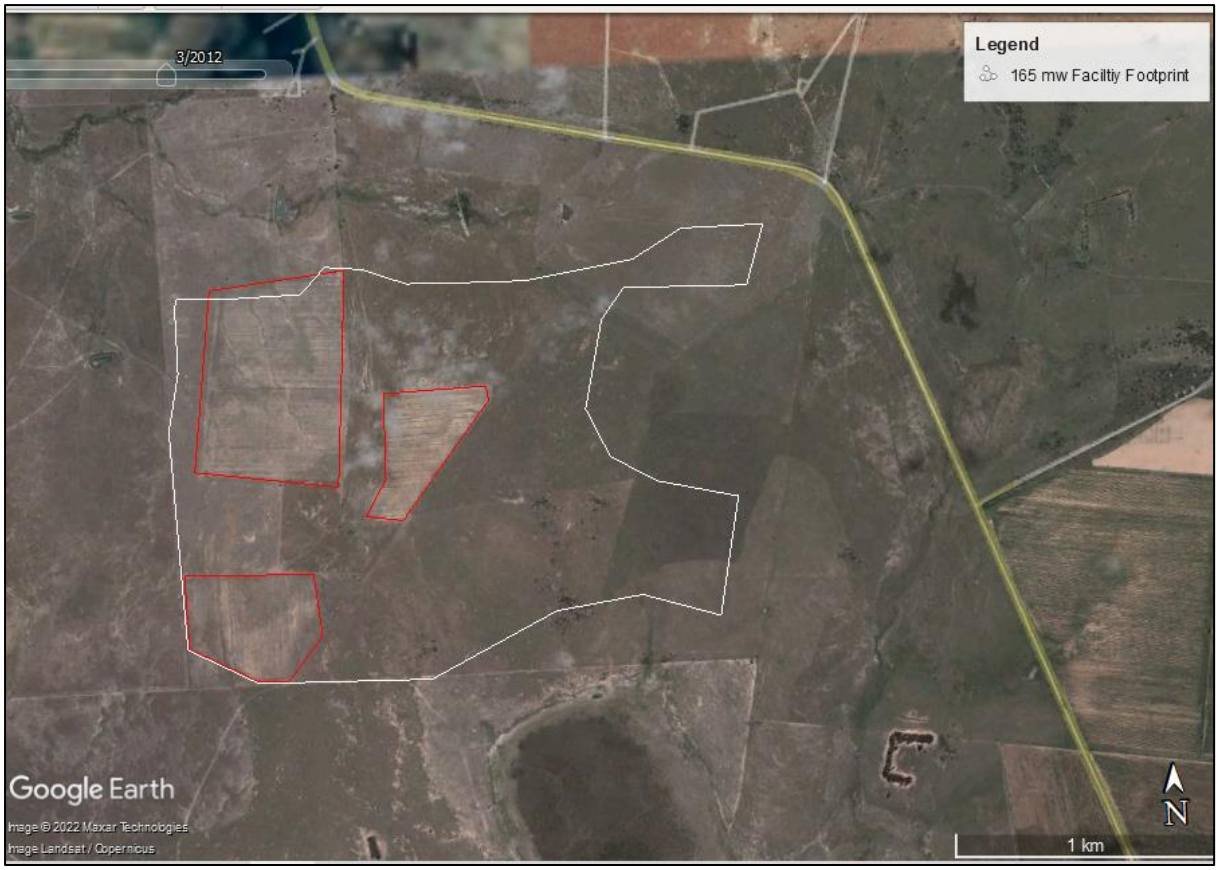

Figure 10 Satellite imagery of the proposed 165 MW development footprint taken in 2012 illustrating the areas that have been transformed via cultivation (demarcated in red).

It is well known that secondary grasslands are usually very slow to recovering to the same species diversity and composition as natural grasslands and thus, secondary grasslands usually have considerably lower floral diversity than primary grasslands (Muller et al., 2021; Nerlekar and Veldman, 2020). Although secondary grasslands may superficially look like primary grasslands (i.e. natural grasslands), they differ markedly with respect to species composition, vegetation structure, ecological functioning and the ecosystem services they deliver (Cadman et al., 2013).

These old lands are dominated by grass species (See Figure 11) such as *Melinis repens, Setaria sphacelate, Eragrostis curvula, Digitaria sp., Pentaschistis airoides, Bromus diandrus*, *Molinia caerulea*, *Chloris gayana* and other herbaceous species such as *Selago densiflora.* This composition is different to that of the Natural Grassland (Section 6.4.3.1.2) which is mostly dominated by *Themeda triandra.* Although some of the ecological functioning (such effects can include lower primary and secondary production, lower decomposition, lower seed dispersal capabilities, and higher invertebrate herbivory (Leidinger et al., 2017) of the natural grasslands may have been lost, the old lands are still likely to support a variety of faunal and floral species and contribute to the overall ecological significance of the area. It is also noted that no threatened or protected species were recorded within these old lands.

Figure 11 Examples of vegetation within Old lands in the southern direction

Figure 12 Examples of vegetation within Old lands in the northern direction

6.4.3.1.2 Natural grassland

These areas are dominated by indigenous species such as *Themeda triandra, Cymbopogon sp., Panicum coloratum, Cynodon* sp. (Figure 13). Although the development footprint is mapped within the Highveld Alluvial Vegetation type, the vegetation found on site is likely more botanically representative of Western Free State Clay Grassland or Central Free State Grassland (both classified as Least Threatened) due to the areas clay-rich soils (confirmed the Aquatic Biodiversity Specialist and Agricultural Specialist) and the dominance of *Themeda triandra* and *Cymbopogon* sp., and the low abundance of trees. See attached Appendix B for a full list of species that were identified within the footprint.

Although classified as Least Threatened, grasslands are highly threatened ecosystems and severely under protected (Cadman et al., 2013). It is one of the most at-risk of South Africa's biomes: more than 40% of it has

already been irreversibly modified, 60% of remaining grassland is considered to be threatened and less than 3% of it is under formal protection. Grassland is also considered to face the greatest risk of significant change due to climate change. Therefore, any loss in this vegetation is not favourable (Cadman et al., 2013).

South Africa's grasslands are a remarkable and irreplaceable biodiversity asset of global significance. In South Africa, grassland plant diversity is second only to that of the Fynbos Biome and grassland ecosystems are home to a large number of the country's rare, endangered and endemic animal species. Grasslands are a rich store of biodiversity assets, including 52 of South Africa's 122 important bird areas, 15 of its endemic mammals and nearly 3,500 plant species (Cadman et al., 2013).

Figure 13 Example of vegetation in Natural grasslands.

6.4.4 Species of conservation concern

6.4.4.1 Plant Species

No species of special concern were identified by the DFFE Screening Tool. However, a list of potential list of plant species of conservation concern that may be located on the development footprint are listed in Appendix B. None of the expected species of special concern were observed during the site visit. It is possible that the development footprint could provide habitat to some of the species of conservation concern. However, this is very unlikely given the previous disturbance history of the area.

6.4.4.2 Animal Species

No species of special concern were identified by the DFFE Screening Tool. However, a list of potential animal species of conservation concern that may be located on the development footprint are listed in Appendix C. None of the expected species of special concern were observed during the site visit. However, suitable habitat for the *Smaug giganteus* (Giant Girdled Lizard) was confirmed on the development footprint (Figure 14). An old burrow was confirmed on the footprint, but this burrow is no longer in use. Only when signs of burrowing are evident can the habitat suitability be known for certain. It should be noted that not all suitable habitat is always occupied by the species.

Typically, it would be recommended that areas delineated suitable habitat for the Giant Girdled Lizard would not be developed (Should this recommendation be fulfilled for this development, it will result in an island of potential habitat (i.e., fragmentation). The probability of the area being inhabited by the Giant Girdled Lizard after development is expected to be low. Therefore, avoiding an “island” of suitable habitat would not retain the function of the suitable habitat as colonisation of these areas by *S. giganteus* is unlikely.

To have effective suitable habitat for the species, it is recommended that potential suitable Giant Girdled Lizard habitat outside of the development footprint (Figure 14) be set aside and avoided. Areas outside of the development are connected to intact vegetation and the likelihood of these areas of suitable habitat being utilised by the Giant Girdled Lizard is expected to be high.

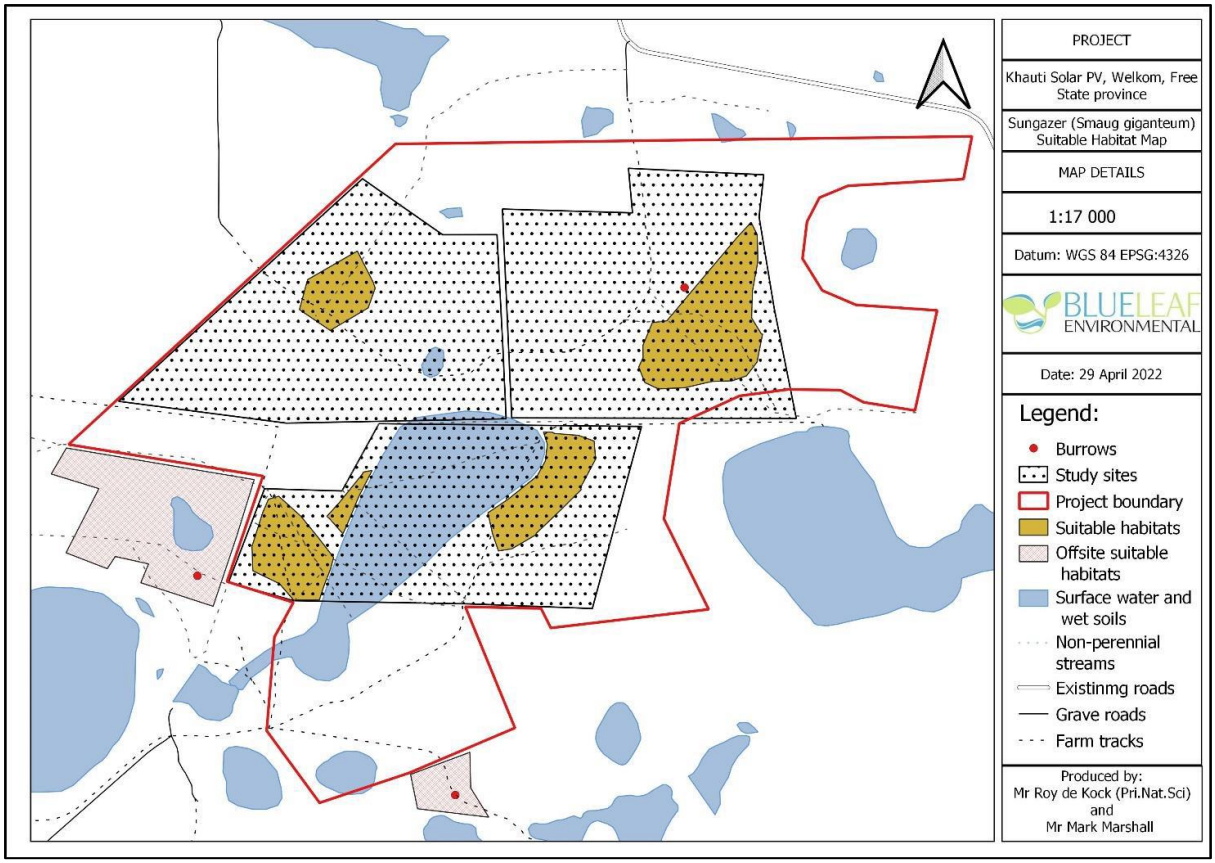

Figure 14 Giant Girdled Lizard habitat and location map within and surrounding the Khautu Solar Pv Study Site (Blue Leaf Environmental, 2022)

A variety of fauna were recorded on site including *Danus chrysippusa, Amietia delalandii* and *Hystrix* sp. Other common species that are likely to inhabit the area are listed in Appendix C. Given that there is potential habitat surrounding the development footprint, any faunal species that inhabits the development footprint, will likely be able to find refuge in the surrounding areas.

6.4.5 Sensitive Areas

Ecological support areas have been delineated in the footprint due to the presence and functioning of wetlands (Collins, pers. comm). Therefore, areas delineated as wetlands and their buffers must then be avoided to ensure the functioning of the ESA remains intact. Based on the Aquatic Verification Report (EcoFocus, 2022), there are no confirmed wetlands on the proposed 165 MW footprint. Therefore, it is verified that all areas verified to be ESA's have been avoided.

It is, however, recommended that all wetlands remain connected via an ecological corridor to ensure the movement of animals and seed dispersal of plants between ESAs (delineated as per Figure 15). This area is recommended to be avoided, but has already been incorporated into design of the solar farm as denoted in the Figure 15.

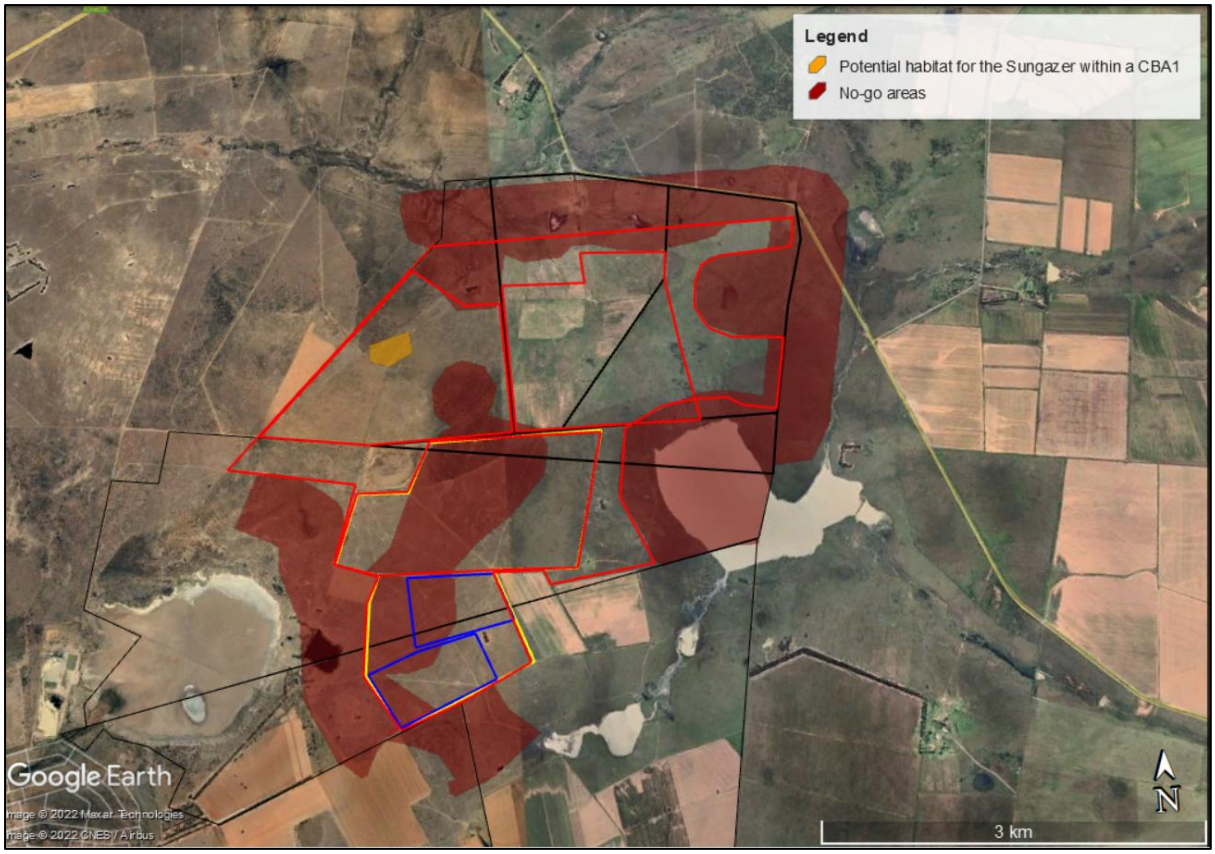

Figure 15 Recommended no-go areas (demarcated in red) within the solar PV farm development footprints

6.4.6 Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

The proposed solar farm will transform the existing surface vegetation inside the development footprint. The development will cause indigenous vegetation loss and disrupt minimal ecological functioning across the development footprint. Although almost half of the development footprint was confirmed to be old agricultural land, the footprint still sustains important ecological function even if some of the floral diversity has been lost.

The PES Score of the proposed solar farm development footprint is B. The overall footprint currently consists of natural grassland. In these areas, species diversity is likely to be significantly high, and the contribution to overall ecological functioning of the area is expected to be high. Therefore, the area is likely to contribute to the overall ecosystem functioning of the total solar farm footprint.

The EIS of the development footprint is B (High) given that the areas are still likely to contribute to the overall ecological functioning of the area. Species composition and diversity has likely not been altered but is expected to currently inhabit mostly non-threatened species that are common to the wider area. It was also confirmed that part of the development footprint is included in a CBA.

6.5 Site Sensitivity Verification of the Environmental Themes

The DFFE National Screening Tool Classified the proposed development area as “Very High” sensitivity for the Terrestrial Biodiversity theme and “Low” sensitivity for the Plant Species theme, and “High” for the Animal Species Theme.

Specific areas within the proposed development site have been classified as Critically Biodiverse Areas (CBAs) (Figure 6) as stipulated in the Section 6.4.5. These areas have been confirmed on the footprint due to suitable habitat for the Giant Girdled Lizard (see Section 6.4.5). Therefore, these areas are of conservation value.

With reference to the vegetation description, the vegetation and soil is more associated with grassland vegetation especially that of the Central Free State Grassland and Western Free State Clay Grassland (both vegetation types are classified as Least Threatened). In terms of vegetation condition, much of the habitat units or ecosystems (as listed in Section 6.4.3.1) within the development footprint are homogenous overall and do not contain any species of special concern. The footprint is considered to be of ecological importance as it is expected to contribute to the overall ecosystem functioning of the wider area.

The overall proposed development footprint is degraded but does have elements of the indigenous vegetation type and is likely to contribute to the over ecological functioning of the area. Based on the aforementioned site verification, the development footprint has been confirmed to be classified as “Low” for the Terrestrial Biodiversity Theme and “Low” for the Plant Species Theme, and “Medium” for the Animal Species Theme.

7 Overall impact assessment

The following section provides descriptions of the potential ecological impacts which the proposed project will have as well as the recommended mitigation measures to be implemented for each impact as identified below.

7.1 Site establishment and initial excavation phase impacts

Destruction of Indigenous Vegetation

Vegetation loss of rehabilitating grassland and natural will occur during the site establishment and initial construction phase. Although most of the site has been previously transformed/degraded, the footprint is still likely to fulfil important ecosystem functioning and the vegetation does represent at least some of the elements of the indigenous vegetation type.

Mitigation measures to reduce potential impacts:

- The project footprint must be demarcated before construction commences
- Disturbance of areas outside of the footprint is strictly prohibited.

- Movement of vehicles and construction personnel should be restricted to the already developed informal roads to limit trampling of indigenous species and prevent disturbance to the surrounding vegetation.
- No vegetation outside of the footprint may be picked, collected, chopped (in the case of trees), or damaged.
- All bare areas must be rehabilitated according to a rehabilitation plan which is expected to be compiled by a suitably qualified botanist or rehabilitation specialist.
- Areas between the solar panels must be kept vegetated where feasible.
- It is recommended that the following method statements be compiled
    - Clearance of vegetation
    - Management of topsoil
    - Clearing and management of alien invasive species
- All stockpile areas must be restricted to the development footprint.
- No plants may be removed that have not been specifically earmarked as part of the demarcated footprint.
- Topsoil stockpiles must be regularly monitored (quarterly) for the emergence of alien invasive species.
- Stockpiles on vegetation not earmarked for development is strictly prohibited.
- All personnel must be subjected to awareness training to make the personnel aware of the mitigation measures as stipulated above.

Loss of topsoil and soil erosion

Soil disturbance and vegetation removal due to construction activities and vehicular movement is expected during the construction phase. This is expected to create areas of soil which are prone to erosion especially during high rainfall events. The construction activities of the proposed project could potentially result in erosion of sand (especially topsoil) stored in stockpiles. Windblown sand in excessive amount could result in deleterious effects on the surrounding natural environment.

- All areas disturbed outside the footprint must be effectively rehabilitated.
- Rehabilitation must be completed via a Rehabilitation Plan which should be compiled by a Rehabilitation/Botanical Specialist.
- Disturbance outside of the footprint is strictly prohibited.
- All stockpiles must be kept to a height of 2 m.
- Given that the area is prone to strong winds and short-lived high rainfall events, it is recommended that stockpiles be covered to avoid the stockpiles from eroding.
- All stockpiles must be placed on a level ground and in demarcated areas.

Impact on Listed or Protected Plant Species

No species of conservation concern were found within the development site. However, the footprint does include areas that are likely to be suitable habitat for protected species (as found on the adjacent solar farm development footprints). However, the species found on the adjacent footprints are not threatened and thus, the sensitivity of the site remains low for the proposed development footprint.

Mitigation measures to reduce potential impacts:

- A search and rescue operation must be conducted prior to commencement of excavation during the flowering period (August-November) of herbs, succulents, and grasses. This will ensure that no provincially protected or threatened species have potentially been missed.
- Should any threatened species be located within the footprint, these must be translocated to a suitable location outside of the development footprint.
    - Translocation methodology and suitable areas must be detailed in a Translocation Method Statement compiled by an Environmental Compliance Officer. This method statement must be reviewed and signed by a Botanical Specialist.
- Should any protected or threatened species be removed from the footprint, a Plant Removal Permit must be obtained from the Free State Department of Economic, Development, Tourism, Environmental Affairs prior to any being removed.
- No plants may be removed that have not been specifically earmarked as part of the demarcated footprint.
- Excavation, movement of personnel and vehicles must be restricted to the development footprint.
- All personnel must be subjected to awareness training to make the personnel aware of the mitigation measures as stipulated above.

Impact on Faunal Species

Some faunal species were observed on the development footprint including suitable habitat for *S. giganteus*. While the majority of these species are not threatened or protected, the impact on the suitable habitat for *S. giganteus* must be taken into consideration. Mitigation measures to reduce potential impacts:

- No animals may be hunted, trapped, or captured.
- Search and Rescue operations should occur before the project works begin to ensure that any slow moving or burrowing species (such as moles, chameleons, snakes or tortoises) would be moved to adjacent suitable habitats by a qualified Faunal Specialist.
- Vehicles should be restricted to a clearly demarcated area and drivers must be vigilant.
- A speed limit of 20km per hour should apply to the roads on site to reduce the chance of road fatalities.
- Avoidance of all vegetated systems in the surrounding area.
- No personnel should be allowed to walk outside of the development footprint.
- All personnel should attend an environmental induction which includes awareness raising around the illegal collection or fauna and flora.

- All suitable habitats for *S. giganteus* outside of the development footprint must be avoided.
- A pre-construction walk through of the suitable habitat for S. giganteus within the footprint must done to confirm the absence of the species.
- Emergency numbers for all animal related incidents must be clearly displayed in the offices.
- The Environmental Officer must be a trained snake handler.
- No feeding of any fauna is allowed.
- If any individuals or burrows of *Smaug giganteus* are observed, they must be recorded, and the ECO immediately notified.

Alien Invasive Species Establishment

Areas within and around the proposed project footprint are prone to establishment of alien invasive species due to disturbances caused by construction activities. Considering that the proposed solar farm footprint and surrounds consists of patches indigenous vegetation, spreading of alien invasive species into surrounding areas would have a negative impact.

Mitigation measures to reduce potential impacts:

- Implement suitable alien invasive species establishment prevention measures during the excavation phase such as proper storage, transport and disposal of plant material and minimizing disturbance to the area surrounding the development footprint.
- Impacted areas must be adequately rehabilitated to prevent significant alien invasive species establishment.
- The project footprint and stockpiles and surroundings should be monitored during the initial excavation period for alien invasive species, and annually for the lifetime of the mine and managed according to each species during the operational phase.
- Any detected alien invasive species should be controlled using the appropriate methods and removed plant material should be properly handled and disposed of to prevent the spread and propagation of alien invasive species.
- An alien invasive species management plan must be compiled for the proposed development area to ensure that the spread of alien invasive species will be controlled.
- Care should be taken to remove any biological material from equipment, personnel clothing and gear before entering and when leaving the work site to prevent the spread and establishment of alien invasive species.

Damage to sensitive habitats

The development footprint includes areas mapped as sensitive in in terms of the Free State Biodiversity Spatial Plan. These areas have been delineated as Ecological Support Areas (ESA). These areas have been delineated

due to the presence and functioning of wetlands. By avoiding wetlands and their buffers, the functioning of the ESAs are expected to be preserved.

Areas outside of the development footprint have been confirmed to be ESAs (areas mapped as wetlands and their buffers). Avoiding these areas will reduce the impact on the ESA.

Mitigation measures to reduce potential impacts:

- Construction activities, movement of personnel and vehicles must be restriction to the informal pathways, areas already transformed, and the development footprint.
- Areas between the solar panels should be kept as naturally/ vegetated as possible
- Areas around the development footprint that fall within a Critical Biodiverse Areas (CBA) and ESA must be adequately rehabilitated from any disturbance.
- All watercourses and their buffer areas must be avoided as per the Aquatic Impact Assessment Report (Eco Focus, 2022)
- All ecological corridors as per Figure 15 must be avoided and treated as no-go areas.

Dust generation and emissions

The construction activities of the proposed project could potentially result in significant fugitive dust emissions, due to excavations and vegetation removal, which could spread into the surrounding areas. Due to the remote location of the proposed development, the significance of this potential impact will however be low and only temporary.

Mitigation measures to reduce potential impacts:

- Implement suitable dust management and prevention measures during the initial excavation phase.
- Areas around the proposed development footprint must be adequately rehabilitated to prevent significant dust emissions

Changing local fire regime from wildfires

Increased fire occurrences may encourage the invasion of alien invasive species and a reduction in geophytic species diversity and abundance. Alterations in the species composition or plant guild (group of species that exploit the same resources, or that exploit different resources in related ways e.g., pollination strategy) composition of the Grassland may negatively impact the ecological functioning of the area. Due to the proximity of the proposed development to natural vegetation, the potential risk of a veld fire is high.

Mitigation measures to reduce potential impacts:

- No open fires are permitted within or around the proposed development site.
- Smoking should only take place in designated areas away from the natural vegetation and cigarette buds must disposed of properly in an astray.

- At least one (1) construction personnel must be trained in firefighting and the remaining personnel should be briefed on the emergency procedures during a veld fire.
- Fire extinguishers should be present within vehicles and on site.
- The emergency contact details of the local firefighting department should be present at the construction office.
- Have appropriate fire breaks around facility.
- All personnel must be made aware of the above-mentioned mitigation measures.
- The applicant must join the local Fire Protection Agency.

7.2 Operational phase Impacts

Continued Alien Invasive Species Establishment

Areas around the development footprint, could potentially continue to be prone to significant alien invasive species establishment due to the activities associated with the operational phase of the proposed project and continued foot and vehicular traffic. Soil stored seedbanks could also persist in the topsoil stockpiles and thus provide a stepway for the spread and persistence of alien invasive species in the landscape.

Mitigation measures to reduce potential impacts:

- The presence of alien invasive plant species should be monitored (preferably annually) for the lifetime of the mine and if observed, it must immediately be removed in the correct and environmentally friendly manner.
- The monitoring and removal of alien invasive species must be conducted as per an Operational Alien Invasive Species Management Plan.
    - This plan must be compiled by the Applicant/operations personnel and reviewed by a Botanical Specialist.
- Employees and vehicles should be restricted to already disturbed access paths and avoid disturbing indigenous vegetation and soil outside of the solar farm footprint

Increased risk of veld fires

The risk of veld fires is high as a result of human presence and potential electrical fires. The impact of increased frequency of veld fires is expected to be increased by the close proximity of the proposed footprint to natural vegetation.

Mitigation measures to reduce potential impacts:

- Smoking is only permitted within 3 metres (3m) of designated smoking areas.
- Open fires are strictly prohibited.
- Fire breaks must be maintained.

- Alien invasive species in the area should be removed as it can increase the probability of the ignition.
- Fire extinguishers must be made at the site offices and in the vehicles.
- Fire emergency procedures and emergency contact details must be made available to all the personnel and be visible at the site office.
- The applicant must join the local Fire Protection Agency.

Impact on Faunal Species

Some faunal species were located on the footprint and surrounding area. However, these species are not threatened or protected. During the operational phase of the mine, faunal species are expected to be impacted by disturbance of vehicles and personnel.

Mitigation measures to reduce potential impacts:

- No animals may be hunted, trapped, or captured
- Vehicles should be restricted to a clearly demarcated area and drivers should be vigilant.
- A speed limit of 20km per hour should apply to the roads on site to reduce the chance of road fatalities.
- Avoidance of all vegetated systems in the surrounding area.
- No personnel should be allowed to walk outside of the development footprint.
- All personnel should attend an environmental induction which includes awareness raising around the illegal collection or fauna and flora.
- Emergency numbers for all animal related incidents must be clearly displayed in the offices.
- The Environmental Officer must be a trained snake handler.
- No feeding of any fauna is allowed.
- Any new Giant Girdled Lizard communities must immediately be reported to the correct authorities.
- It is also recommended that the Applicant involve themselves in academia and partner with universities to:
    - Monitor the existing population/colonies of the Giant Girdled Lizard
    - Determine an effective translocation protocol for the Giant Girdled Lizard (if required)
    - Monitoring areas within the development footprint for the establishment of any colonies.

Waste Management

The operation of the facilities poses a pollution risk to the environment, should any general and hazardous waste generated be improperly disposed of.

Mitigation measures to reduce potential impacts:

- Sufficient waste receptacles should be placed around the facility to encourage personnel to use them.
- The principle of reduce, re-use and recycle should be followed.

- Any hazardous waste such a fuel must be stored at a warehouse, in a bunded area, at the processing plant.
- Hazardous waste produced by the development works must be disposed of at a registered waste facility. .

Positive Impact of Rehabilitation

A positive impact on the environment is possible if the surrounding areas of site are suitably rehabilitated and restored to host a structure, composition, and ecological functioning similar to the surrounding vegetation. It is expected that a post-construction rehabilitation must be compiled to provide detailed rehabilitation targets and measures.

- All areas disturbed outside the footprint must be effectively rehabilitated.
- Rehabilitation must be completed via a Rehabilitation Plan which should be compiled by a Rehabilitation/Botanical Specialist.
- Clear and completely remove all structures and temporary infrastructure in areas not identified as part of the development footprint.
- Remove all inert waste and rubble, such as excess rock, and remaining aggregates. Only once this material has been removed, the disturbed surrounding areas shall be re-instated and rehabilitated.
- The replacement of topsoil in areas surrounding the development footprint should be sought in situ immediately after the disturbance.
- All stockpiled topsoil together with herbaceous vegetation should be replaced and redistributed over a disturbed area such as temporary access roads.
- Topsoil must be returned to the same site from where it was stripped.
- When insufficient topsoil remains, soil of a similar quality can be obtained from a nearby area within the area which was disturbed.
- All re-growth of invasive vegetative material must be monitored by the Applicant during the operational phase of the mine.
- To reduce the visual impact of the proposed development (as recommended by the Visual Impact Assessment (Enviroworks, 2022)), it is recommended that the solar farm be screened by a row of trees including *Vachelia karroo, Olea europaea* and *Searsia lancea*.
- All areas under rehabilitation are to be treated as no-go areas using danger tape and steel droppers/fencing and cordoned off, to prevent vehicular, pedestrian and livestock access.
- Active alien invasive plant control measures must be implemented to prevent invasion by exotic and alien vegetation within the disturbed area.
- Rehabilitation structures must be inspected regularly for the accumulation of debris, blockages, instabilities, and erosion with concomitant remedial and maintenance actions.

8 Cumulative impacts

The area surrounding the proposed development footprint is adjacent to natural vegetation, residential areas, and agricultural lands. Therefore, the proposed development will contribute cumulatively to the removal of grassland and habitat for faunal species (including *S. giganteus)*. However, this impact is not expected to be large since the footprint consists of a vegetation type classified as Least Threatened. It is also noted that the Ecological Support Area (ESA 1 and 2) mapped within the footprint has been verified to be outside the development footprint

Note that it is doubtful whether an isolated patch will be inhabited by individuals of *S. giganteus*. Therefore, areas of suitable habitat outside of the footprint (which are also connected to natural vegetation) are then recommended to rather be avoided.

The proposed project will provide significant socio-economic benefits to the local community via job creation and security. If mitigation measures are implemented and best-practice environmentally friendly excavation-, and operation methods are followed, the project will provide significant benefits gaining socio-economic benefits from the energy sector while resulting in minimal impact on the ecological function of the overall area.

9 Recommendation

Grasslands are highly threatened ecosystems and severely under protected (Cadman et al., 2013). Therefore, any loss in this vegetation is not favourable. However, the specific footprint inhabits grassland previously disturbed by grazing pressure and agriculture which has resulted in most of the area being classified as Degraded in the Free State Biodiversity Spatial Plan. The footprint's contribution to the wider area's ecological functioning and species diversity is expected to be moderate due to the disturbance history of the area. Part of the footprint is mapped within ESAs, but this area has been recommended not to be classified as a ESA given the avoidance of wetlands and their buffers (See explanation in Section 6.4.5).

No threatened species or species of conservation concern (SCC) (or sensitive species as defined by the Screening Tool) (as identified by the Screening Tool) were observed within the development footprint during the site visit. However, suitable habitat for *Smaug giganteus* was recorded on the footprint (Appendix C). Preserving these areas of suitable habitat would result in fragmentation and colonising the area would be unlikely, it is recommended that suitable habitat areas outside of the development footprint be avoided. These areas are connected to areas of intact vegetation and thus, it would be more likely that these areas would be utilised or colonised.

To reduce the potential loss of grassland vegetation, it is expected that areas between the solar panels be kept as natural as possible, and a rehabilitation plan be compiled by Botanical/Rehabilitation specialist. This rehabilitation plan is expected to set rehabilitation targets and measures for areas disturbed outside of the footprint. To reduce the visual impact of the proposed development (see Visual Impact Assessment;

Enviroworks, 2022), it is recommended that the solar farm be screened by a row of trees including *Vachelia karroo, Olea europaea* and *Searsia lancea.*

If all mitigation measures are implemented, the likelihood of significant impacts occurring, and the consequence of the impacts are significantly reduced to acceptable levels (see risk ratings and potential impacts). All risk, their ratings and specific mitigation measures can be viewed in Risk ratings and potential impacts section below. The facility poses a low risk to the sensitive areas if the mitigation measures and recommendations are implemented.

10 Risk ratings and potential impacts

Project alternative	Potential environmental impact/ Nature of impact	Environmental significance																
		Before mitigation									After mitigation							
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative	Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative
Project activity		**Site establishment and initial construction phase impacts**																
PROPOSED DEVELOPMENT OF A 165 MW PHOTOVOLTAIC SOLAR FARM ON PORTION 0 OF THE FARM KOPJE ALLEEN NO. 81 AND PORTION 1 OF THE FARM KOPJE ALLEEN NO. 81, KHAUTA NORTH SOLAR PV FACILITY, NEAR RIEBEECKSTAD, MATJHABENG LOCAL MUNICIPALITY, FREE STATE PROVINCE	Destruction of Indigenous Vegetation	8	5	2	3	4	4	88	**Medium High**	**Medium**	6	5	2	3	4	3	60	**Medium**	**Medium**
	Loss of topsoil and soil erosion	4	5	2	2	4	3	51	**Medium**	**Medium**	2	2	1	2	2	2	11	**Low**	**Low**
	Impacts on Listed or Protected Plant Species	4	5	1	2	3	2	30	**Low**	**Low**	0	2	0	0	0	2	4	**Low**	**Low**
	Impact on Faunal Species	4	5	1	2	3	2	30	**Medium**	**Low**	2	2	1	2	2	2	11	**Low**	**Low**
	Alien Invasive Species Establishment	4	5	1	2	3	2	30	**Low**	**Low**	0	2	0	0	0	2	4	**Low**	**Low**
	Damage to sensitive habitats	8	5	2	3	4	4	88	**Medium High**	**Medium**	6	5	2	3	4	3	60	**Medium**	**Medium**
	Dust generation and emissions	4	3	2	2	4	3	45	**Medium**	**Medium**	2	3	2	1	1	3	27	**Low**	**Low**

Project alternative	Potential environmental impact/ Nature of impact	Environmental significance																	
		Before mitigation									After mitigation								
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative	Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative
	Changing local fire regime from wildfires	6	3	2	3	4	4	72	Medium	Medium	2	3	1	2	2	2	20	Low	Low
Project activity		**Operational phase**																	
PROPOSED DEVELOPMENT OF A 165 MW PHOTOVOLTAIC SOLAR FARM ON PORTION 0 OF THE FARM KOPJE ALLEEN NO. 81 AND PORTION 1 OF THE FARM KOPJE ALLEEN NO. 81, KHAUTA NORTH SOLAR PV FACILITY, NEAR RIEBEECKSTAD, MATJHABENG LOCAL MUNICIPALITY, FREE STATE PROVINCE	Continued Alien Invasive Species Establishment	6	4	1	3	3	3	51	Medium	Medium	2	4	1	1	1	2	18	Low	Low
	Increased risk of veld fires	6	3	2	3	4	3	54	Medium	Medium	4	3	1	2	3	3	39	Low	Low
	Waste Management	4	2	1	2	2	3	33	Low	Low	2	3	1	1	1	3	24	Low	Low
	Impact on Faunal Species	4	2	1	2	2	3	33	Low	Low	2	3	1	2	3	3	33	Low	Low
	Dust generation and emissions	4	2	1	2	2	3	33	Low	Low	2	3	2	1	1	3	27	Low	Low
	Positive Impact of Rehabilitation	4	3	2	0	0	3	9	Low (+)	-	;4	3	2	0	0	3	27	Low (+)	-

11 Conclusion

If all mitigation measures are implemented, the likelihood of significant ecological impacts occurring within the ecosystems, found within the development site, will be reduced to acceptable low-medium levels. The overall footprint of the proposed facility is not likely to generate a high-very high impact on broad scale ecological processes or landscape connectivity, on condition that all mitigation measures are followed. It is thus recommended that the proposed development application be approved from an Animal Species, Plant Species, and Terrestrial Biodiversity Theme perspective provided that all mitigation measures are implemented.

12 References

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13. Appendixes

Appendix A - Specialist and Review Specialist CVs.

Appendix B - List of plant species recorded on the footprint during 9 March 2022.

Appendix C - List of potential faunal species that may inhabit the site based on sightings on the footprint and immediate surrounding area.

Appendix D -. Faunal Survey Report: *Smaug giganteus* (Giant girdled lizards)

APPENDIX A

Curriculum Vitae of specialist

Name:	Megan
Surname:	Smith
Highest qualification:	MSc Biological Sciences (UCT)
South African Association of Botanists	Ordinary member since 2020
Botanical Society of southern Africa	No. 80495
IAIAsa membership	No. 6459
EAPASA membership	2020/2855 (Candidate EAP)
SACNASP registration	130295 (Pr.Nat.Sci)
Years' experience conducting botanical/ecological related works in the Cape Floristic Region	>6 years

RELEVANT QUALIFICATIONS AND TRAINING

- MSc Biological Sciences (UCT): Specialising in Plant Ecology
- BSc Hons Botany (NMU)
- BSc Environmental Sciences (NMU)
- Scientific writing training led by Dr Pippin Anderson (August 2019)
- Fynbos plant identification training (July 2019)
- CDM calibration training by Renew Technologies (August 2020)
- ISO 14001:2015 Lead auditor training by SACAS (March 2021)
- Hydropedology and wetland delineation course led by WETrust and digital Soils Africa (September 2021)

WORK EXPERIENCE

- March 2015 – September 2016: Research assistant determining sustainable cultivation practices of Honeybush (*Cyclopia* spp.) at NMU
- March 2019 – April 2020: Restoration Ecology and Conservation Planning intern at SANBI
- March 2019- December 2021: Lead several Fynbos Identification courses for amateur botanists
- April 2020 – current: Environmental consultant and legal assistant at Enviroworks

PUBLISHED ARTICLES:

- Smith, M., Rebelo, A.G. 2020. The Amazing Nature Race. Veld and Flora 106: 16-21.
- Smith, M., Rebelo, A., Rebelo, A.G. 2020. Passive restoration of Critically Endangered Cape Flats Sand Fynbos at lower Tokai Park section of Table Mountain National Park, Cape Town. ReStory
- Smith, M., Rebelo, A., Rebelo, A.G. 2020. Saving Critically Endangered Peninsula Granite Fynbos from extinction at Tokai Park, Cape Town. ReStory.
- Smith, M., Rebelo, A.G. 2020. iNaturalist: your portal into nature and becoming a citizen scientist. African Wildlife and Environment 75.

BASIC ASSESSMENT

- The proposed development of a thirty-five metre (35m) telecommunication base station and associated infrastructure on Portion 42 of Farm 428, Plettenberg Bay, Western Cape Province, SBA Towers South Africa.
- The proposed development of a twenty-five metre (25m) telecommunication base station and associated infrastructure on Lorraine Farm, the Remainder of Farm 790, Phillipi Western Cape Province, SBA Towers South Africa.
- The proposed development of a desalination or reverse osmosis plant, Tormin Mine, Western Cape Province (in progress), Mineral Sands Resources
- Proposed expansion of chicken houses from approximately 30 000 to 60 000 chickens, Bulhoek Farm, near Swartruggens, Northwest Province, Quantum Foods (in progress).
- Proposed expansion of the Samrand Data Centre, African Data Centres (in progress).

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

- Proposed mixed use development on Farm 820, Caledon (in progress).

WASTE MANAGEMENT LICENSE APPLICATION

- Proposed expansion of chicken houses from approximately 30 000 to 60 000 chickens, Bulhoek Farm, near Swartruggens, Northwest Province, Quantum Foods (in progress)

WATER USE LICENSE APPLICATION

- Proposed expansion of chicken houses from approximately 30 000 to 60 000 chickens, Bulhoek Farm, near Swartruggens, Northwest Province, Quantum Foods (in progress)

ENVIRONMENTAL MANAGEMENT PLANS

- The proposed development of a thirty-five metre (35m) telecommunication base station and associated infrastructure on Portion 42 of Farm 428, Plettenberg Bay, Western Cape Province, SBA Towers South Africa.
- The proposed development of a twenty-five metre (25m) telecommunication base station and associated infrastructure on Lorraine Farm, the Remainder of Farm 790, Phillipi Western Cape Province, SBA Towers South Africa.
- The proposed development of a desalination or reverse osmosis plant, Tormin Mine, Western Cape Province (in progress), Mineral Sands Resources
- Proposed expansion of chicken houses from approximately 30 000 to 60 000 chickens, Bulhoek Farm, near Swartruggens, Northwest Province, Quantum Foods (in progress).
- Proposed development of a protea hotel within the Kruger National Park, Phalaborwa, Limpopo Province, South African National Parks (SANParks) (In progress).
- Proposed development of the Lendlovu Lodge, Addo Elephant Park, Eastern Cape Province, SANParks (in progress).
- Proposed expansion of the Samrand Data Centre, African Data Centres (in progress).

BOTANICAL, FAUNAL, AND TERRESTRIAL IMPACT STUDIES

- Botanical Impact Assessment: Rezoning and the development of fifteen (15) resort units on Portion 12 of the Farm Riet Valley no. 452, Hessequa Local Municipality, Western Cape Province (Faunal Compliance Statement and Botanical Impact Assessment), Hessequa Municipality.
- Botanical survey and delineation of sensitive areas for the proposed development of a six-point three kilometre (6.3km) long pipeline along Macassar Road, Macassar, Cape Town, Western Cape Province, BVi Consulting Engineers Western Cape.
- Botanical, Faunal and Terrestrial Biodiversity Compliance Statement; Proposed expansion of chicken houses from approximately 30 000 to 60 000 chickens, Bulhoek Farm, near Swartruggens, Northwest Province, Quantum Foods.
- Protected tree and animal species survey, and compilation of an alien invasion management plan for Ramatlabama Poultry Farm, Mahikeng, Northwest Province, Supreme Poultry (in progress).
- Botanical, Terrestrial and Faunal Compliance Statement; Proposed development of a Battery Energy Storage Facility, Ashton, Western Cape Province.
- Botanical and Faunal Site Sensitivity: Proposed housing development on erven 2244 & 2245; Private Landowner (in progress).
- Botanical, Faunal, and Terrestrial Impact Assessment: Proposed sand mining permit on Erf 656, Schaap Kraal, located in the Wynberg Magisterial District, Atlantic Sands (in progress).

REHABILITATION IMPLEMENTATION PLANS

- Protocols for restoring Critically Endangered Cape Flats Sand Fynbos within lower Tokai Park, Cape Town, South African National Biodiversity Institute)
- Proposed development of a six-point three kilometre (6.3km) long pipeline along Macassar Road, Macassar, Cape Town, Western Cape Province, BVi Consulting Engineers Western Cape.
- Rehabilitation implementation plan and consultation services for Tormin Mine, Western Cape Province, Mineral Sands Resources (in progress)
- Rehabilitation Method Statement for 132 kV and 33 kV transmission lines, transmission substation, cabling line trenches, and access roads on Roggeveld Wind Farm, Western Cape, Raubex Infra.
- October 2021 Rehabilitation progress report: 132 kV and 33 kV tranmission lines, transmission substation, cabling line trenches, and access roads on Roggeveld Wind Farm, Western Cape, Raubex Infra.
- Reseeding Method Statement: 132 kV and 33 kV tranmission lines, transmission substation, cabling line trenches, and access roads on Roggeveld Wind Farm, Western Cape, Raubex Infra.
- November 2021 Rehabilitation progress report :132 kV transmission line, Roggeveld Wind Farm, Western Cape, Raubex Infra.
- March 2022 Rehabilitation progress report :132 kV transmission line and substation, Roggeveld Wind Farm, Western Cape, Raubex Infra.
- Reseeding training: Roggeveld Wind Farm, Western Cape, Raubex Infra.

WETLAND DELINEATIONNAD S(C) &(I) RISK MATRICES

- Residential development on portion 205 of Farm 559, Hangklip, Western Cape Province, private landowner.
- Proposed development of a community hall and associated parking lot on erven 4978 & erven 4979 on a portion of Portion 6 of the Remaining Extent (Re) of the Farm Selosesha Townlands No. 900, Thaba ‘Nchu, Free State Province, Mission Point (in progress)

ENVIRONMENTAL CONTROL OFFICER (ECO) AND AUDITING

- Environmental Control Officer: The proposed development of a backup energy centre including diesel storage and generators, on Erf 142504, Diep River, Cape Town, Western Cape Province, African Data Centres.
- The proposed construction of new and rehabilitation of existing non-motorised transport facilities in the Cape Town CBD, Western Cape Province, BVi Consulting Engineers Western Cape.
- Environmental Compliance Audit for Franki Africa Stock Yard, Durban, KwaZulu Natal Province, Franki Africa.
- The proposed development of a twenty-five metre (25m) telecommunication base station and associated infrastructure on Lorraine Farm, the Remainder of Farm 790, Phillipi Western Cape Province, SBA Towers South Africa
- The proposed maintenance of the Blue Stone Quarry Wall, Robben Island, Robben Island Museum.

MAINTENANCE MANAGEMENT PLANS

- The proposed maintenance of the Blue Stone Quarry Wall, Robben Island, Robben Island Museum.
- Proposed erosion control measures for road OP06914 on Swartvlei Lake, Sedgefield, Garden Route District Municipality.

ENVIRONMENTAL SCREENING

- Proposed upgrading of the Durbanville Public Transport Interchange, Western Cape, BVi Consulting Engineers Western Cape.
- Proposed the upgrade on national road R40 section from Hazyview (km 0.0) to Maviljan (km 32.1), BVi Consulting Engineers Western Cape.
- Proposed development of a data centre in Tatu City, Kenya, Africa Data Centre (in Progress)
- Proposed construction of a back-up data energy centre on Erf 33, Atlantic Hills Business Park, Durbanville, Africa Data Centre
- Proposed development of a data centre in Grand Bassam, Côte D'ivoire, Africa Data Centre (in progress)

ALIEN INVASIVE SPECIES MANAGEMENT PLANS

- Invasive species monitoring, control and eradication plan, Garden Route District Municipality, Western Cape Province, Garden Route District Municipality.
- Rehabilitation implementation plan and consultation services for Tormin Mine, Western Cape Province, Mineral Sands Resources (in progress)
- Protected tree and animal species survey, and compilation of an alien invasion management plan for Ramatlabama Poultry Farm, Mahikeng, Northwest Province, Supreme Poultry (in progress).

CLEAN DEVELOPMENT MECHANISM

- Calibration and advisory services for the CDM Methane Burning Plant at the Coastal Park and Bellville South Landfill Sites, Promethium Carbon (in progress)

Curriculum Vitae of review specialist

Curriculum Vitae

I worked as an environmental consultant for the past 14 years and since December 2019 have been self-employed as a botanical, agricultural and soil specialist. I have a BSc Hons in Geology, an MSc in Botany and is currently completing a PhD in Botany/Soil science. I have experience in project management and have led numerous EIAs in the Eastern Cape, Northern Cape, Gauteng, Mpumalanga, and North West Provinces. My projects include SANRAL road projects, renewable energy developments, mining applications (quarries and BPs), mixed-use developments and numerous smaller infrastructure EIAs. My largest project was a multi-million Rand Special Economic Zone (SEZ) development in Upington, Northern Cape. Before studying I worked as a financial advisor for ABSA Bank for 9 years and have 3 years high school mathematics and science teaching experience.

Personal Details

Name	Roy de Kock
Identification number	7606 2205 3202 082
Current address	31 Aster Avenue, Sunridge Park, Port Elizabeth, Eastern Cape, South Africa
Email	roy@blueleafenviro.co.za
Contact number	+27 76 281 9660
Driver's license	Code 08 (EB)
Language competencies	English (excellent verbal and writing) Afrikaans (excellent verbal and writing)

Education

Qualification	Institution	Year
PhD Botany and Soil Science	Nelson Mandela University	Current
MSc Botany	Nelson Mandela University	2010
BSc (Hons.) Geology	Nelson Mandela University	2008
BSc Botany & Geology	Nelson Mandela University	2007
Diploma in Marketing	University of Witwatersrand	2003

Skill Highlights

Project Management and Environmental Consulting	– Extensive experience in project management and have led numerous projects of various scales throughout South Africa. – Managed over 200 projects over an 11-year period. – Managed up to 15 projects at a single time.

	– My projects included SANRAL road projects, renewable energy developments, mining applications (quarries and BPs), mixed-use developments and numerous smaller infrastructure EIAs. – My largest project was a multi-million Rand Special Economic Zone development in Upington, Northern Cape. – Experience in conservation management and have developed various management plans for protected areas within the Eastern Cape and Gauteng.
Environmental Legislation	I have extensive experience in interpreting and applying the following International, National, Provincial legislation: <u>International:</u> – IFC Performance Standards – Equator Principles <u>National:</u> – National Environmental Management Act – National Environmental Management Act (EIA Regulations) – National Environmental Management Waste Act – National Environmental Management Air Quality Act – National Environmental Management Biodiversity Act – National Environmental Management Protected Areas Act – National Water Act – National Forestry Act – Conservation of Agricultural Resources Act **<u>Provincial</u>** I am well versed in provincial environmental legislation and regulations in the following provinces: – Gauteng – Western Cape – Eastern Cape – Northern Cape – North West – Mpumalanga
Specialist consulting	– Worked as a specialist for the last 11 years while managing projects. – Self-employed as a botanical and soil specialist since January 2020. – SACNASP registered as a Professional Natural Scientist. – Written over 50 botanical, ecological and biodiversity assessments.

	– Done over 25 agricultural and soil assessments for numerous mining (and other) EIAs throughout SA and Mozambique and even have experience drafting rehabilitation and closure plans for large mines (graphite, REEs, Iron). – In the last 2-3 years I have started drafting wetland and river assessments – Drafted a few visual assessments throughout the years. – Done numerous Water Use Licences for a variety of cliens including farmers, contractors and developers
Finance	– 9 years working experience as a financial advisor for ABSA Bank. – Consulted commercial clients to assist in cash flow issues – Done retail consulting for small businesses and private individuals
Teaching	– 3 years' experience in teaching Mathematics, Science, Biology and Geography to High School grades. – 1-year experience in teaching advance mathematics as an online course to Secondary School grades.
Environmental Auditing	– Drafted over 100 environmental and safety protocols for various developers throughout South Africa – Implemented and audited numerous environmental and safety protocols during all phases of development (Planning, construction, operations, decommissioning and closure) – Drafted numerous Environmental and Social Management Systems (ESMS) for international clients – Audited various ESMS's throughout South Africa

Work Experience

Environmental and Soil Consultant
BlueLeaf Environmental (Pty) Ltd – 12/2019 to current

- Conducting specialist studies for various projects in South Africa including:
  - Ecological assessments
  - Biodiversity studies
  - Agricultural and Soil assessments
  - Aquatic assessments
  - Visual assessments
- Water Use Licensing (abstraction, borehole, bridges & culverts)

- Plant and animal relocation permits (National and Provincial)
- Plant and animal Search and Rescue.
- Environmental Risk Assessments
- Mine Rehabilitation and Closure Plans

Principal Environmental Consultant
Employer: CES Environmental and Social Advisory Services, East London, Eastern Cape - 04/2010 to 12/2019

- Managed numerous projects of various sizes including budget management, client liaison, timeframe targets, managing junior consultants and sub-consultants.
- Prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc.
- Projects have also included preparation of applications in in terms of other statutory requirements, such as water-use and mining license /permit applications.

Feasibility assessments
- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.

Specialist studies
- Conducting specialist studies for various projects in both South Africa and the rest of Africa (Mozambique, Madagascar, Zambia, Malawi) including:
  - Ecological assessments
  - Agricultural and Soil assessments
  - Aquatic assessments
  - Water Use Licensing (abstraction, borehole, bridges & culverts)
  - Plant and animal relocation permits (National and Provincial), and
  - Plant and animal Search and Rescue.

Laboratory technician
Nelson Mandela University (Faculties of Botany, Zoology and Biochemistry, Port Elizabeth, Eastern Cape – 02/2009 to 03/2010

Assisting students and postgraduates in receiving, labeling, and analyzing samples, design, set-up and conducting of experiments. Designing and executing laboratory testing according standard procedures. General laboratory maintenance of equipment including calibrations, glassware, and chemicals.

School Teacher
Hananja Private School, Jeffreys Bay, Eastern Cape – 01/2007 to 12/2009
Private online tutor East London, Eastern Cape – 01/2020 to current

Teaching Grades 8 to 12 Mathematics, Geography, Biology and Science.
Online teaching Advanced Mathematics and Science Grades 4-7 (2019-current)
Financial Advisor
ABSA Bank Florida, Gauteng – 02/1995 to 12/2003

Assisting clients to determine their expenses, income, insurance coverage, financial objectives, tax status, risk tolerance, or other information needed to develop a financial plan. Answering client questions about financial plans and strategies and giving financial advice. Also worked as:

- Bankteller
- Enquiries clerk
- Administrative assistant
- Treasurer
- Retail sales consultant

Professional Registrations

- SACNASP – Registered as a professional natural scientist (Ref 400216/16)
- IAIASa – Registered as an environmental practitioner
- SAAB – South African Association of Botanists
- LaRSSA – Land Rehabilitation Society of South Africa

APPENDIX B

Plant species recorded on the development footprint are listed in Table 10.

Table 10 Plant species recorded on the proposed development footprint on 18 and 19 January 2022

Species name	Habitat Unit	Recorded in 1100 MW footprint?	Common name	Family	Redlist status	Protected Status	Alien Invasive Species Category
Ammocharis coranica	Grassland	NO	Berg Lily	AMARYLLIDACEAE	Least Concern	Provincially Protected	N/A
Gladiolus permeabilis	Grassland	NO	Patrysuintjie	IRIDACEAE	Least Concern	Provincially Protected	N/A
Cymbopogon sp.	Grassland	YES	N/A	POACEAE	Least Concern	Not Protected	N/A
Commelina africana	Wetland	YES	Common Yellow Commelina	COMMELINACEAE	Least Concern	Not Protected	N/A
Cyperus erectus	Wetland	NO	N/A	CYPERACEAE	Least Concern	Not Protected	N/A
Vachellia karroo	Grassland	YES	Cape Thorn Tree	FABACEAE	Least Concern	Not Protected	N/A
Helichrysum arenarium	Grassland	NO	dwarf everlast	ASTERACEAE	Least Concern	Provincially Protected	N/A
Gomphocarpus fruticosus	Wetland	NO	Balbos	APOCYNACEAE	Least Concern	Not Protected	N/A
Cirsium vulgare	Grassland	NO	Spear Thistle	ASTERACEAE	N/A	Not Protected	1b
Setaria sphacelata	Grassland	YES	Common Bristle Grass	POACEAE	Least Concern	Not Protected	N/A
Themeda triandra	Grassland	YES	Red Grass	POACEAE	Least Concern	Not Protected	N/A
Arrhenatherum elatius	Grassland	YES	Franse Hawergras	POACEAE	Not Evaluated	Not Protected	Naturalised exotic

Melinis repens	Grassland	YES	N/A	POACEAE	Least Concern	Not Protected	N/A
Polygala hottentotta	Grassland	YES	Small Purple Broom	POLYGALACEAE	Least Concern	Not Protected	N/A
Molinia caerulea	Grassland	YES	purple moor-grass	POACEAE	Not Evaluated	Not Protected	Naturalised exotic
Sonchus asper	Grassland	YES	Common Sowthistle	ASTERACEAE	Not Evaluated	Not Protected	Naturalised exotic
Eragrostis capensis	Wetland	YES	Bosluisgras	POACEAE	Least Concern	Not Protected	N/A
Cyperus congestus	Wetland	NO	Hedgehog Sedge	CYPERACEAE	Least Concern	Not Protected	N/A
Selago densiflora	Wetland and Grassland	YES	N/A	SCROPHULARIACEAE	Least Concern	Not Protected	N/A
Berkheya sp.	Grassland	YES	African Thistle	ASTERACEAE	Least Concern	Not Protected	N/A
Hibiscus pusillus	Grassland	YES	Bladderweed	MALVACEAE	Least Concern	Not Protected	N/A
Hypoxis sp.	Wetland	NO	N/A	HYPOXIDACEAE	Least Concern	Not Protected	N/A
Stackhousia sp.	Wetland	NO	N/A	STACKHOUSIACEAE	Least Concern	Not Protected	N/A
Pentaschistis airoides	Grassland	YES	N/A	POACEAE	Least Concern	Not Protected	N/A
Bromus diandrus	Grassland	YES	N/A	POACEAE	N/A	Not Protected	Naturalised exotic
Chloris gayana	Grassland	YES	N/A	POACEAE	Least Concern	Not Protected	N/A

APPENDIX C

Animal species that are likely to occur on the footprint are listed in Table 11.

Table 11 Animal species likely to be found on the proposed development footprint (which have also been recorded on the footprint or surrounding area)

Species name	Common name	IUCN threat status	Protected Status
Reptiles and amphibians			
Sclerophrys capensis	Raucous Toad	Least Concern	Not protected
Dasypeltis scabra	Egg-eating Snake	Least Concern	Not protected
Cacosternum boettgeri	Boettger's dainty frog	Least Concern	Not protected
Kassina senegalensis	Common Bubbling Kassina	Least Concern	Not protected
Trachylepis punctatissima	Speckled Rock Skink	Least Concern	Not protected
Crotaphopeltis hotamboeia	Red-lipped Herald	Least Concern	Not protected
Leptotyphlops scutifrons	Peter's Thread Snake	Least Concern	Not protected
Smaug giganteus	Girdled lizards	Vulnerable	Provincially Protected
Mammals			
Vespertilioninae	Vesper Bats	Least Concern	Not protected
Phacochoerus africanus	Southern Warthog	Least Concern	Not protected
Galerella sanguinea	Common Slender Mongoose	Least Concern	Not protected
Sylvicapra grimmia	Common Duiker	Least Concern	Not protected
Hystrix africaeaustralis	Southern Porcupine	Least Concern	Not protected
Insects and Arachnids			
Trinervitermes	Common Snout Termites	Least Concern	Not protected
Crematogaster transvaalensis	Transvaal Cocktail ant	Least Concern	Not protected
Camponotus maculatus	Spotted Sugar Ant	Least Concern	Not protected
Chrysopidae	Green Lacewings	Least Concern	Not protected
Gonimbrasia belina	Mopane Worm	Least Concern	Not protected
Euprosthenops	Funnelweb Spiders	Least Concern	Not protected
Chalybion spinolae	False Mud-dauber Wasp	Least Concern	Not protected
Graphipterus atrimedius	N/A	Least Concern	Not protected
Litopus latipes dispar	Long horn beetle	Least Concern	Not protected
Ophiusa tirhaca	Green Drab	Least Concern	Not protected
Mantidae	Mantids	Least Concern	Not protected
Popa spurca	African Stick Mantis	Least Concern	Not protected
Halictini	Sweat Bees	Least Concern	Not protected
Coenomorpha nervosa	Brown Bark Bug	Least Concern	Not protected
Lixini	Weevils	Least Concern	Not protected
Listroderes costirostris	Vegetable Weevil	Least Concern	Not protected
Imatismus	Tapering Darkling Beetles	Least Concern	Not protected
Apis mellifera subsp. scutellata	African Honeybee	Least Concern	Not protected
Xylocopa	Large Carpenter Bees	Least Concern	Not protected
Tephraea dichroa	Wild Potato Fruit Chafer	Least Concern	Not protected

APPENDIX D

Faunal Survey:
Smaug giganteus
(Giant girdled lizards)

Khauta Solar PV facility near Welkom in the Free State Province

Prepared for:

Ms Megan Smith
Environmental Consultant
Enviroworks
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Tel: 076 965 8002

Date submitted: 11 May 2022

Mr Roy de Kock M.Sc (*Pri.Nat.Sc.*)
Ecologist and Biodiversity specialist
Blue Leaf Environmental (Pty) Ltd.
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6045

East London:
163 Cowrie Crescent
Cove Rock Country Estate
East London
5213

Table of Contents

1. Declaration of independence

I, Roy de Kock as duly authorised representative of Blue Leaf Environmental (Pty) Ltd, hereby confirm my independence (as well as that of BlueLeaf) as a specialist and declare that neither I nor BlueLeaf have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Enviroworks was appointed as environmental assessment practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the proposed new Khauta Solar PV Facility near Welkom in the Free State Province. I further declare that I am confident in the results of the studies undertaken and conclusions drawn because of it – as is described in this report.

_____

Full Name: Roy de Kock

Title / Position: Ecologist
Qualification(s): BSc (Hons) Geology; MSc Botany; Candidate PhD Botany
Experience (years/ months): 15 years
Registration(s): SACNASP (400216/16)
Tel: +27 76 281 9660
Email: roy@blueleafenviro.co.za

2. Expertise of specialist

Roy has over 15 years' experience in environmental consulting and specialist services in the Eastern Cape. Various projects throughout South Africa as well as Africa at larges has also been undertaken. Projects include baseline studies, impact assessments and compliance auditing for various large-scale projects including numerous wind farms, roads (National and Provincial), and infrastructure development projects. Roy has also conducted numerous specialist studies including but not limited to Ecological and Botanical assessments, Biodiversity studies, Plant and Animal Search and Rescue, Fauna and Flora permits, Aquatic Assessments, Agricultural and Soil Assessments and Environmental and Venomous animals training workshops.

Roy holds a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela University in Port Elizabeth. He is currently busy with his PhD (Doctorate degree) in Botany and Soil Science. He has over 15 years' experience in the environmental consulting focussing on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies.

Roy is a registered as a professional natural scientist (Pri.Sci.Nat.) with SACNASP (Registration nr: 400216/16).

Mr Mark Marshall assisted in this study. Mark is a renowned reptile specialist with over 21 years of experience in studying, relocating, and rehabilitating various reptile species in South Africa. Mark owns a reptile rehabilitation centrum in Port Elizabeth which has successfully managed the rehabilitation and release of thousands of reptile species over the last 15 years. Mark is also one of the few specialists that has kept and successfully bred with sungazers in captivity.

3. Introduction

The sungazer (*Smaug giganteus*, syn. *Cordylus giganteus*), also known as the giant girdled lizard, giant dragon lizard, or giant zonure (Moton; 2014) is the largest species of the Cordylidae, a family of lizards from sub-Saharan Africa (Branch; 1998). This threatened species is endemic to Highveld grasslands in the interior of South Africa (Branch; 1998). In 2011, it was assigned to the new genus *Smaug*, along with seven other species previously belonging to the genus *Cordylus,* based on a comprehensive molecular phylogeny of the Cordylidae (Stanley *et al*; 2011).

S. giganteus or sungazers is the largest of the girdled lizards. It is brown in colour on the upper surface; merging to straw/yellow colouring along the side of the body and yellow underneath. They have four very large, spiny scales on the back of the head. Along the body the dorsal (back) scales are larger than the lateral (side) scales, which are smaller but still spiny. The tail has whorls of large, very spiny scales, decreasing in size from the base to the tip. Juveniles are generally similar to adults but with patches of orange-brown on the body.

Figure 3.1: Photo image of a sungazer (Source: Endangered Wildlife Trust; EWT)

The species is known as the sungazers because of its distinctive thermoregulatory behaviour of elevating the anterior parts of the body by extending its fore limbs, usually near the entrance of its burrow as if looking at the sun.

Sungazers, unlike other girdled lizards which live on rocks, make shallow burrows in open grassland. They are diurnal (active during the day) and are often seen basking on the ground near the burrow or, less often, on a termite mound. They live in colonies and dig burrows into the sandy loamy soils of *Themeda* (red grass/rooigras) grassland in South Africa. They hibernate (dormant state like sleep) during the winter and are rarely seen at all between May and mid-August.

Sungazers only reproduce every other year, and only produce one or two offspring. They are viviparous meaning they give birth to live young. The population is thought to be in decline due to habitat destruction through the conversion of grassland to farmland (maize, sunflower, and other crop farming), illegal collecting for the pet trade, as well as collection for the muti (traditional medicine) industry. Conversion/transformation (especially ploughing) of native grassland is the biggest threat to the species. It has been recorded that sungazers do not seem to return to previously ploughed land.

The sungazer is endemic (only found in one country or geographic area) to South Africa. It is found in the highland grasslands of the north-eastern Free State as well as a small population in southwestern Mpumalanga province (Figure 3.2). The population status is unknown but thought to be declining. Globally and nationally the Giant Girdled Lizard is classified as Vulnerable (IUCN Red List).

The main reason for their small distribution is that they are extremely habitat specific. They are only found in high lying grassland areas dominated by *red grass* on sandy loams soils that are not too wet. Grasses must be kept short (20-30cm in height) by grazers to allow the sungazers to spot natural predators while waiting just outside their borrows for prey. They feed on small insects like grasshoppers and bugs. Juveniles feed on ants mostly.

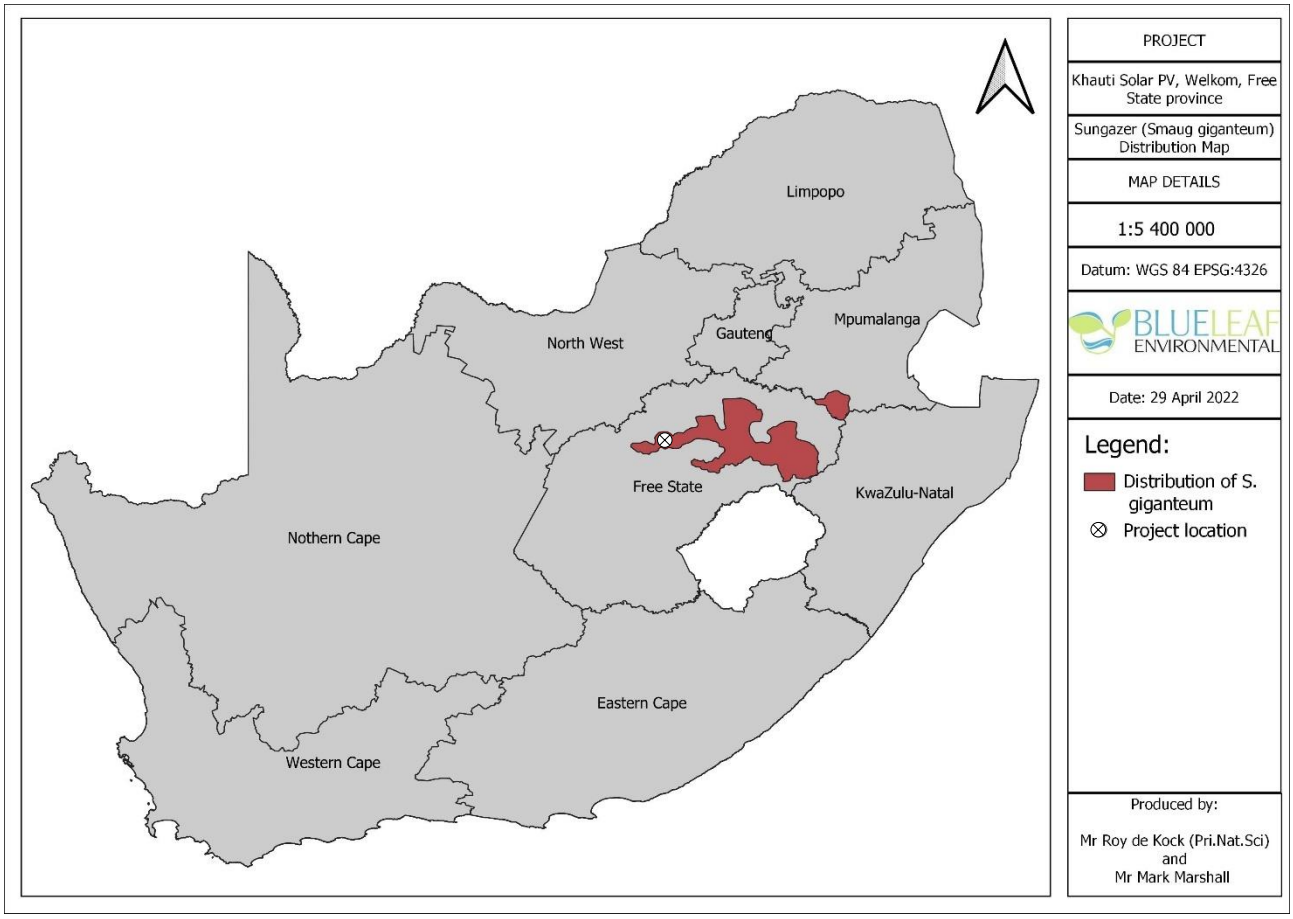


Figure 3.2: Distribution map for *S. giganteum* (Source: Parusnath *et al*; 2017)

The proposed new Khauti Solar PV facility will be located just north of Kimberley and within the westernmost distribution of *S. giganteus (Figure 3.2)*.

Blue Leaf Environmental (Pty) Ltd (BLE) has therefore been appointed by Enviroworks on behalf of the developer to:

1. Identify the distribution of *S. giganteus* colonies within the study site.
2. Identify suitable habitats.
3. Confirming known sites of occurrences.

4. Methodologies

A site visit was conducted between the 30th of April and 1 May 2022 to map the study sites for *S. giganteus* occurrences.

4.1 Study area

The study area was demarcated by Enviroworks and consist of three portions, each within a different landowner's land parcel (Figure 4.1). These land parcels were numbered Portions 1, 2 and 3 for easy reference.

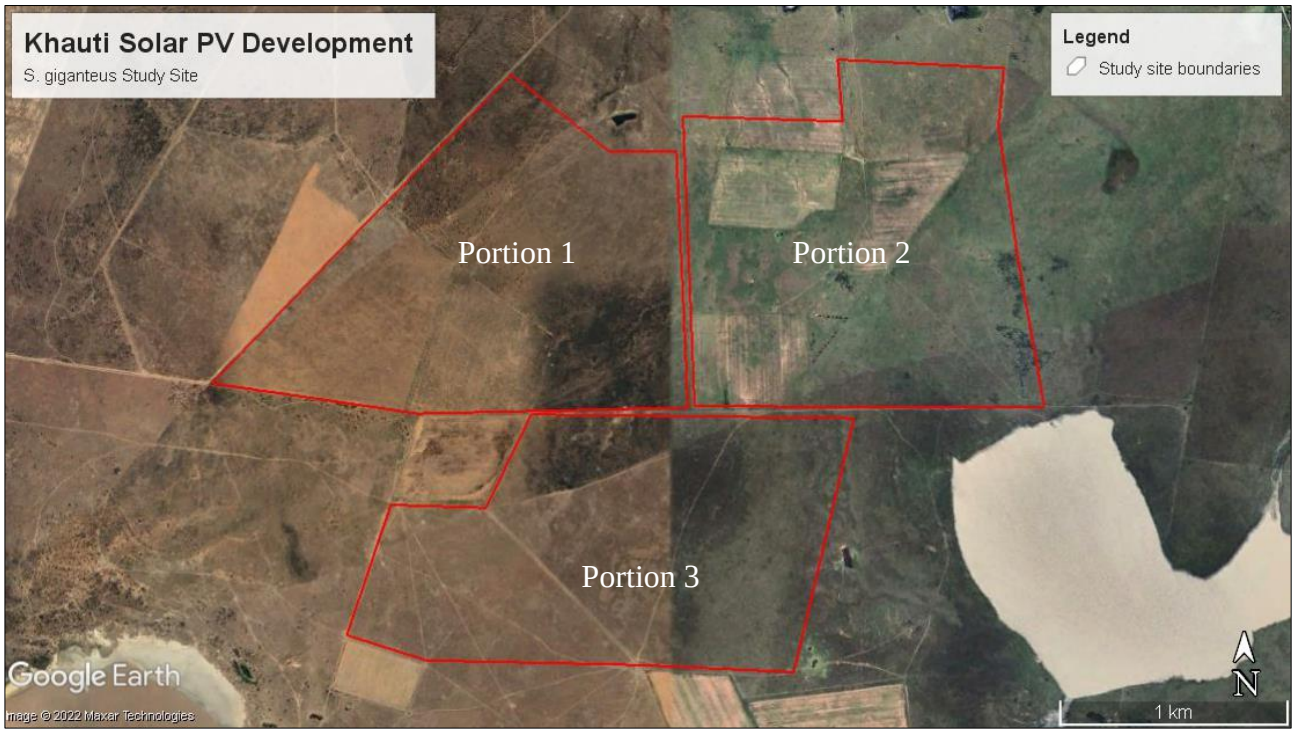


Figure 4.1: Khauti Solar PV study site

Where possible, areas immediately surrounding each land parcel were also investigated.

4.2 Sampling protocol

Each land portion was investigated separately. The entire site was divided into linear lines approx. 50m apart, either north to south or east to west. These lines were then walked while all observations related to sungazers were recorded.

Suitable habitats were identified based on the following criteria:

- If there were evidence of recent ploughing (within the last 10 years) the area was excluded.
- Areas covered by *Themeda* grasses (red grass) were included.
- Areas where compacted sandy loam soils occur with little to no rocks were included.
- Short grasses (less that 30-40 cm in length) were included.
- Wet soils were excluded.

Occurrence of live specimens and burrows were mapped separately from suitable habitats.

Two areas within the study site were identified through literature as high potential occurrence. The one was the northern section of land parcel 1, located between the northern boundary and the dense clump of trees in the central parts of the farm just north of an old cropland (Figure 4.2).

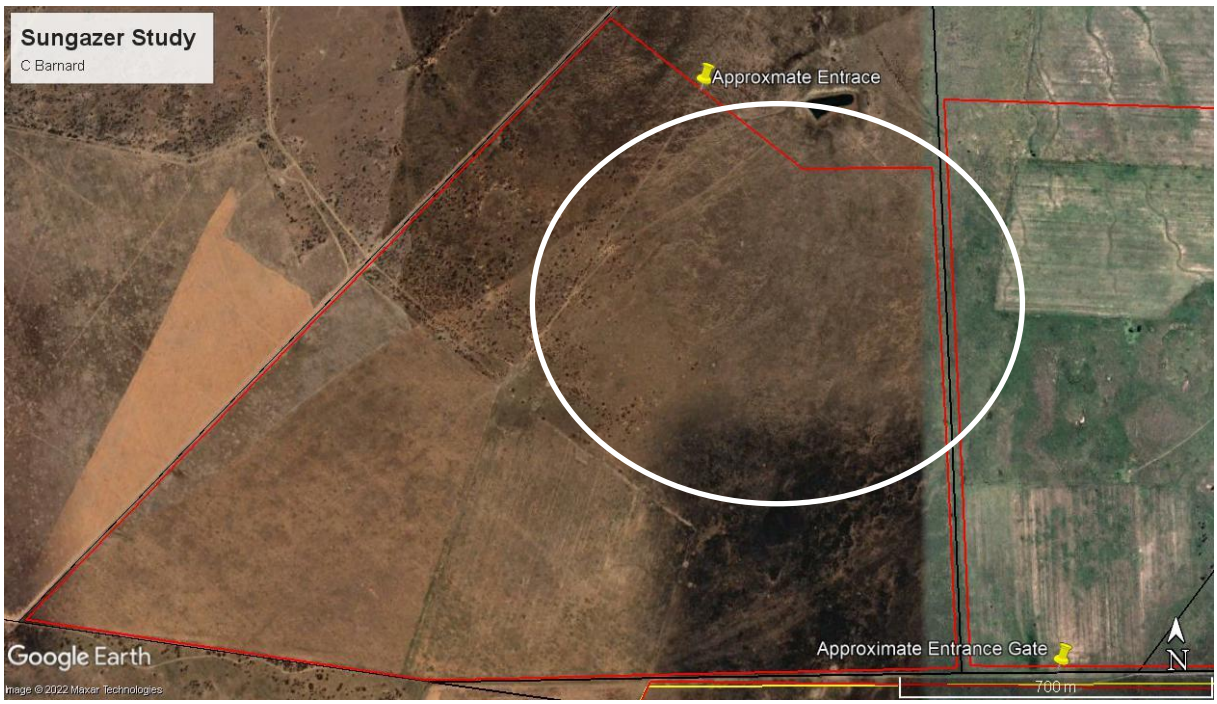


Figure 4.2: High potential sungazer habitat 1 on land parcel 1

A second high potential occurrence area was identified along the western boundary of land parcel 3 (Figure 4.3).

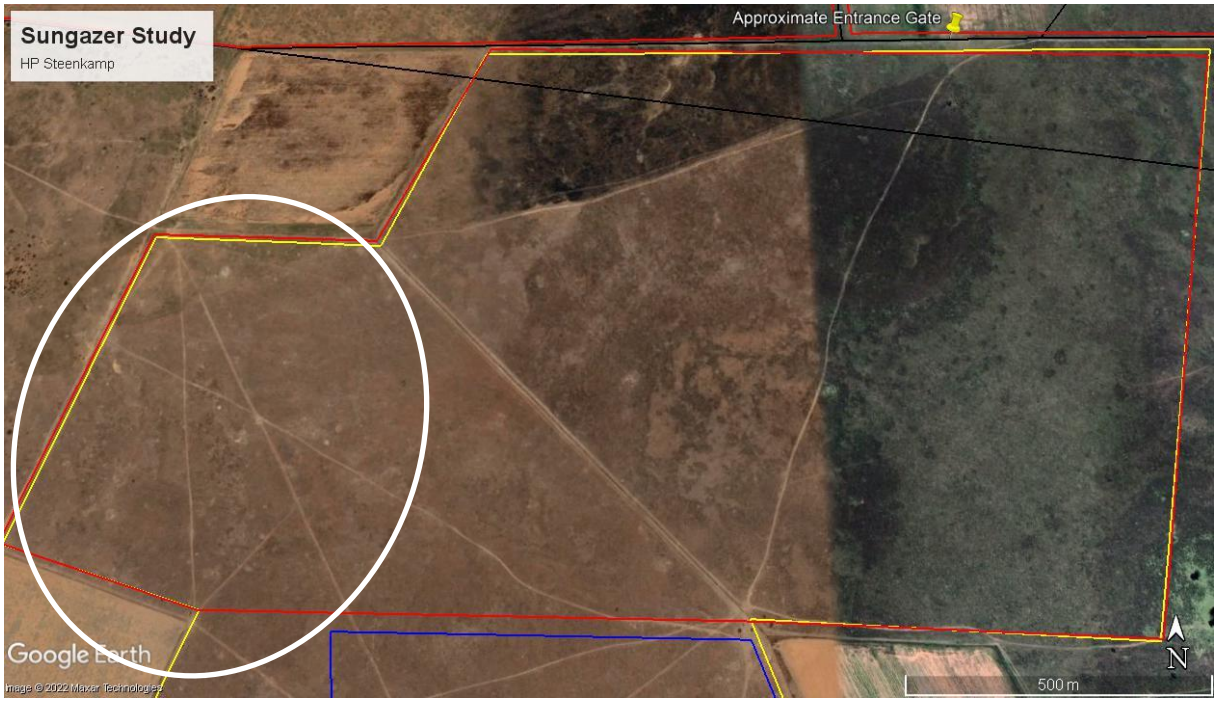


Figure 4.3: High potential sungazer habitat 2 on land parcel 3

Both these areas were surveyed in detail and all findings were recorded.

4.3 Limitations

Sungazers are not very active between May and August (the "cold months"). It also rained the week before the site visit and maximum daily temperatures during the site visit rarely exceeded 20°C. It was therefore assumed that sungazer activities will be limited on site and therefore the study focussed more on finding active burrows that live specimens.

The landowners and farm workers were also interviewed, and historic observation points were noted and visited.

5. Study outcome

Below is a discussion of each of the 3 land parcels investigated during the site visit:

5.2 Land parcel 1

Land parcel 1 did not contain any visible sungazer habitats. Grasses throughout the site were very tall (1m and higher) with no grazing occurring on site. There were small patches of shorter grasses (not *Themeda*) interspersed between the taller grasses (*Themeda*) that may have been suitable habitats, but they were searched, and no burrows, specimens, or traces (tracks and scales) were found. The area identified as high potential sungazer habitat 1 was intensively searched with no results. As a result, this area was still identified as a potential habitat but with no occurrence (See section 5.5 below).

Grasses are taller than 1m:	High potential sungazer habitat 1:
	
Dominantly tall red grass intersperse with small patches of shorter grasses:	
	

5.3 Land parcel 2

Suitable habitats were observed and mapped with no occurrence of any specimens. A single burrow was found at (GPS coordinate: S 27° 52.844'; E 26° 52.173') but the burrow was old with no recent proof of occupation.

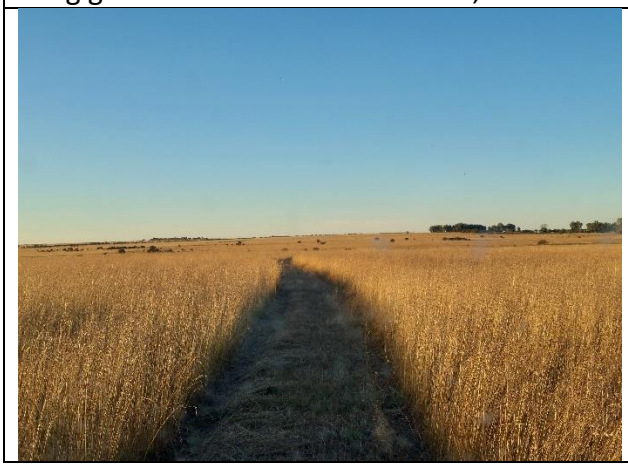
Single sungazer hole on land parcel 2:

Suitable habitats but no specimens of burrows:

5.4 Land parcel 3

As with land parcel 2, suitable habitats were observed and mapped in land parcel 3. No burrows and no live specimens were found within the study site, but 2 areas were mapped outside the study site containing active burrows. Sungazers were not noted in these areas but, because of the cold day, were probably hiding inside their burrows. The landowner and various farmworkers however confirmed observing live specimens in these 2 areas.

Long grasses occur in various areas, but 3 areas were considered as suitable habitats:



5.5 Habitat mapping

Based on all the abovementioned evidence, a map was created of the study site (Figure 5.1). The map shows the extend of all suitable habitats within the study site as well as all burrows and live specimen found within and surrounding the study site. Please note that no live specimens were found and are therefore not mapped on Figure 5.1 below.

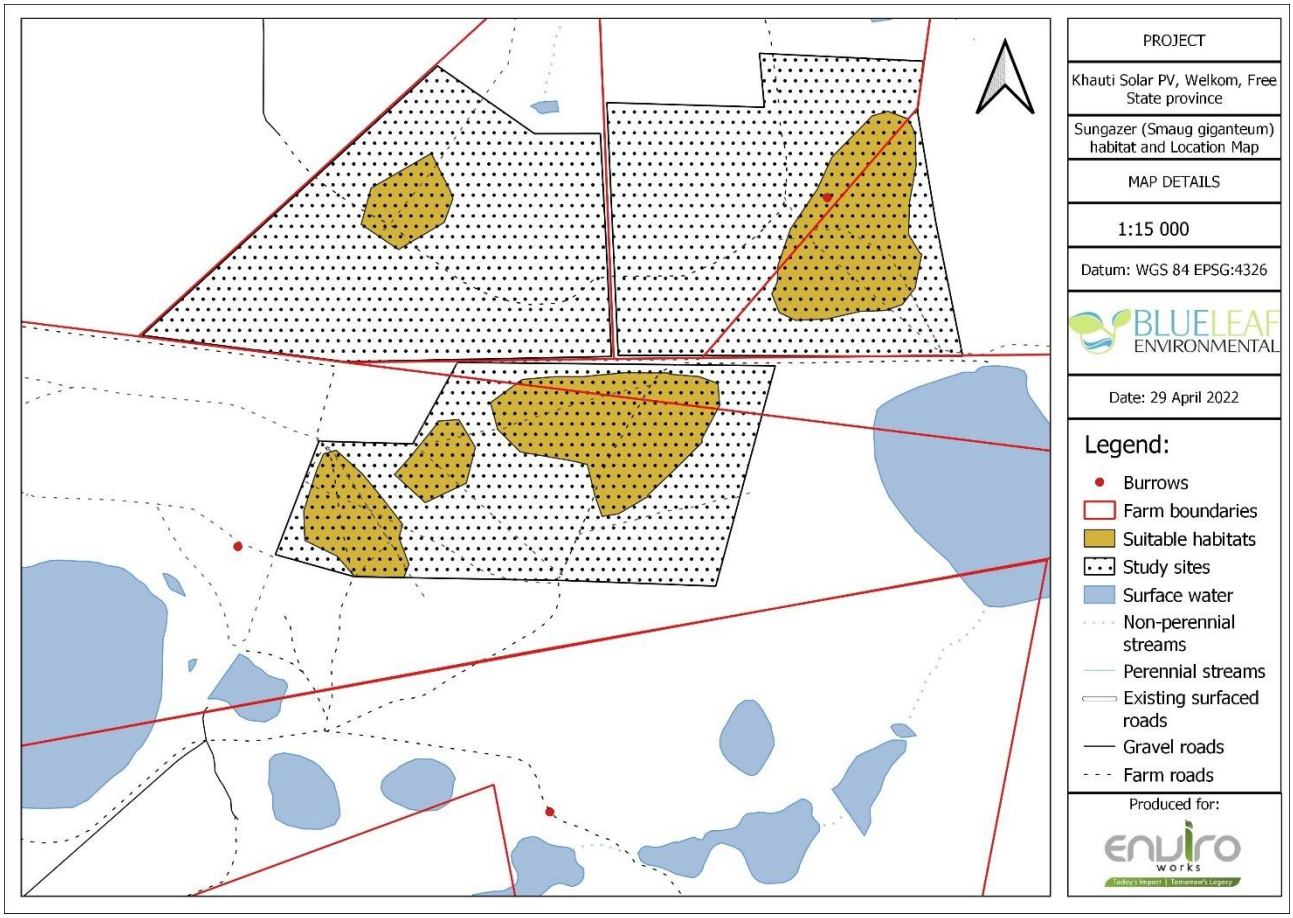


Figure 5.1: Sungazer habitat and location map within and surrounding the Khauti Solar PV study site

6. Conclusion

Below is a summary of the findings:
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6.1 Summary

Even though most of the study site conformed to most of the habitat requirements listed in section 4.2, most grasslands were too long (more that 20-30 cm high) to be considered suitable sungazer habitats with some minor areas waterlogged. The map in Figure 5.1 shows areas where suitable habitats do occur but with no live specimen of burrow occurrence. One unused burrow was found on land parcel 2 (GPS coordinate: S 27° 52.844'; E 26° 52.173') but the burrow was old and unused.

Sungazers are opportunistic hunters sitting in one place near the entrance of their burrows waiting for small prey like bugs and other insects to venture close while at the same time needing to look out for natural predators, so they do not prefer long grasses. Multi grass layers of different ages, older than 1 year, and approx. 1m tall were observed on land parcel 1 so the chances of sungazers occurring on the property is extremely low. A small area in between trees contained small open patches of short grasses between longer grasses but with no burrows. This small patch aligns with the Free State CBA1 map indicating that sungazers may have occurred historically here (called High potential sungazer habitat 1 in this report). No evidence of sungazere or even old burrows were found.

Land parcel 2 had a suitable habitat in its eastern section while land parcel 3 was the most promising section with large suitable habitat parcels throughout the site. However, no specimens or burrows were found. Land parcel 3 also had a high potential sungazer area (called High potential sungazer habitat 2) on its western boundary. Habitats were suitable, but no specimens or burrows were found.

6.1 Recommendations

Based on the abovementioned findings, the following recommendations are made and must be implemented during all phases of the proposed new Khauti Solar PV development:

- Other than the two No-Go sites identified outside the study area, there are no exclusion sites within the study site.
- All suitable habits (as per Figure 5.1) must undergo a micro-siting exercise to confirm the absence of burrows before commencement of any construction related activity onsite.
- The Solar PV site must be monitored regularly (possibly monthly) throughout its operational life for sungazer occurrence and distribution.

Even though numerous areas within the study site were identified as suitable sungazer habitats, no live specimens and no burrows were found. Development of the proposed Khauti Solar PV facility may proceed provided all conditions mentioned in this report is included into the site EMPr and adhered to.

It is the opinion of the specialists that these sungazers may even return during operations of the proposed new Solar PV facility. All solar panels will be mounted on aboveground steel frames lifting these panels off the ground surface. This means that the ground footprint of the Solar PV facility will be relatively small. The Developer will also have to keep the grass underneath these panels short, creating potential safe habitats for sungazers. The only negative factor will be the panels blocking the sun underneath them, but habitats will be suitable, especially around the PV cluster fringes where more sunlight reaches the ground. It may be a good option to conduct academic studies on this occurrence.

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