SCOPING REPORT

Final – 15 June 2023

THE PROPOSED VANADIUM SOLAR POWER PLANT NEAR NORTHAM, LIMPOPO PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	:	14/12/16/3/3/2/2348
Project Title	:	Proposed Vanadium Solar Power Plant near Northam, Limpopo Province
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Client	:	Vanadium Solar Power Plant (RF) (Pty) Ltd
Report Status	:	Final Scoping Report
Submission date	:	15 June 2023

When used as a reference this report should be cited as: Environamics (2023) Draft Scoping Report: Proposed Vanadium Solar Power Plant near Northam, Limpopo Province.

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GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
PAOI	Project Area of Influence
PPP	Public Participation Process

PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SPP	Solar Power Plant
VU	Vegetation Unit

CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fueled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DMRE (Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 IRP Update, 2010-2030), over the short term (of the next two or three years), clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000 MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programmes/opportunities to generate power in South Africa. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

In response to the above, Vanadium Solar Power Plant (RF) (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located on Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province situated within the Thabazimbi Local Municipality area of jurisdiction (refer to Figure A for the locality map). The project entails the generation of up to 150 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 320

hectares (including supporting infrastructure on site) within the assessed 645 hectares assessed as part of the Environmental Impact Assessment.

EXECUTIVE SUMMARY

Like many other developing municipalities in the country, the Tabazimbi Local Municipality faces a number of challenges in addressing the needs of sustainable growth and improved quality of life (Final IDP, 2022 - 2026). The Waterberg District Municipality Integrated Development Plan (2020-2021) states that the district municipality's vision is to be "*a developmental municipality dedicated to the social and economic upliftment of its communities."* The vision of the municipality can be achieved by ensuring the effective utilisation of economic resources to address the socio-economic imperatives. Northam Local Municipality's Spatial Development Framework (2018) further contributes to the vision and mission of the Waterberg District Municipality by aiming to create a conducive environment for investment and sustainable economic development within the municipality.

The Northam Local Municipality's Integrated Development Plan (IDP, 2022-23) identified that the mission of the municipality is to continually work toward the achievement of sustainable job creation opportunities for communities and the ensuring of a safe, healthy and prosperous environment.

Vanadium Solar Power Plant (RF) (Pty) Ltd intends to develop a 150MW photovoltaic solar facility and associated infrastructure on the Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province situated within the Thabazimbi Local Municipality and Waterberg District Municipality area of jurisdiction. The town of Northam is located approximately 2km north of the proposed development (refer to Figure A and B for the locality and regional map). The total development footprint of the project will approximately be 320 hectares (including supporting infrastructure on site) within the 645 hectares as assessed during the Environmental Impact Assessment process. The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access via a main road (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 324-327, as amended (2017), Environmental Authorisation is required for the Vanadium Solar Power Plant. The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- GNR. 327 (as amended in 2017) Activity 9(i): "*The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—(i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more."*

- GNR. 327 (as amended in 2017) Activity 11(ii): "*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."*
- GNR. 327 (as amended in 2017) Activity 12(ii)(a)(b): *"The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."*
- GNR. 327 (as amended in 2017) Activity 14: "*The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- GNR. 327 (as amended in 2017) Activity 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."*
- GNR. 327 (as amended in 2017) Activity 24(ii): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- GNR. 327 (as amended in 2017) Activity 28(ii): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- GNR. 327 (as amended in 2017) Activity 56(ii): *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- GNR. 325 (as amended in 2017) Activity 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."*
- GNR. 325 (as amended in 2017) Activity 15: *"The clearance of an area of 20 hectares or more of indigenous vegetation."*
- GNR. 324 (as amended in 2017) Activity 4 (e)(i)(ee)(gg): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo province, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*
- GNR. 324 (as amended in 2017) Activity 10 (e)(i): *"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, (e) in the Limpopo province, (i) all areas."

- GNR. 324 (as amended in 2017) Activity 12 (e)(ii): *"The clearance of an area of 300 square metres or more of indigenous vegetation (e) in the Limpopo province, (ii) within critical biodiversity areas identified in bioregional plans."*

- GNR. 324 (as amended in 2017) Activity 14(ii)(a)(c)(e)(i)(ff)(hh): *"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; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; in the (e) Limpopo Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) Areas within 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve."*

- GNR. 324 (as amended in 2017) Activity 18 (e)(i)(ee)(gg) : *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (e) in the Limpopo province, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*

Regulation 21 of the EIA Regulations requires that a scoping report must contain the information set out in Appendix 2 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 2 of GNR326 requires that information which is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process undertaken be set out in the scoping report.

It has been determined through the scoping process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development, as identified in this scoping phase, are briefly summarised below.

It must be noted that the EIA phase of the project will consider the impacts on a more detailed level and provide feedback on the facility layout for the proposed project.

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 18 - 24 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation and socio-economic impacts such as the creation

of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and temporary increase in traffic disruptions and movement patterns.

Impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, collision and electrocutions of avifauna and visual impact of sensitive visual receptors located within a 500m radius of the proposed power line. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development and social upliftment.

Impacts during the decommissioning phase:

The negative impacts generally associated with the decommissioning phase include: habitat destruction caused by clearance of vegetation and the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created in the process. It is not expected that the facility will be decommissioned, but rather that the technology used will be upgraded.

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of forestry, Fisheries and Environment database three (3) other solar plants have been proposed in relatively close proximity to the proposed activity.

The potential for cumulative impacts may therefore exist. The Final Scoping Report includes an assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: habitat destruction and fragmentation, impact on the characteristics of the watercourse, displacement of priority avian species from important habitats, loss of important avian habitats, impacts of employment opportunities, business opportunities and skills development and impact associated with large-scale in-migration of people. Cumulative impacts during the operational phase relate to: habitat destruction and fragmentation, impacts on the characteristics of the watercourse and visual intrusion. The cumulative effect of the generation of waste was identified as being potentially significant during the decommissioning phase.

Regulation 23 of the EIA Regulations determine that an EIA report be prepared and submitted for the proposed activity after the competent authority approves the final scoping report. The EIA report will evaluate and rate each identified impact and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application for Environmental Authorisation and to reach a decision contemplated in Regulation 24 of the EIA Regulations.

1 INTRODUCTION

This section aims to introduce the Scoping Report and specifically to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include- (a) details of:
(i) the EAP who prepared the report; and
(ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The Listing Notices 1, 2 and 3 (GNR 327, 325 and 324) outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

Table 1.1: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 9(i)	• *The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—(i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more".* • Activity 9 (i) is triggered since the proposed photovoltaic solar facility will require a new water connection line to the facility. The water connection line will exceed 1000 metres in length with an internal diameter of at least 0.36 metres.
GNR. 327 (as amended in 2017)	Activity 11(ii)	• *"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."* • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The

		infrastructure for the distribution of electricity will include a power line (132kV), an on-site HV/MV substation and switching station (132kV). It is expected that generation from the facility will tie in with one of the existing Eskom 275kV or 400kV lines from Spitskop 400/275/88/kV MTS Substation.
GNR. 327 (as amended in 2017)	Activity 12(ii)(a)(b)	• *"The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."* • Activity 12(ii)(a)(b) is triggered as the proposed water connection line and grid connection corridor crosses a channelled valleybottom wetland. The power line pylons associated with the line will be located either within 32 meters or within the feature itself and will have a footprint of more than 100 square meters. The service road associated with the power line will also need to cross the watercourse.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel) in containers with combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres.
GNR. 327 (as amended in 2017)	Activity 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."* • Activity 19 is triggered as the proposed water connection line and grid connection corridor crosses a channelled valleybottom wetland. The power line pylons associated with the line will be located within the feature itself and will require the removal of more than 10 cubic meters of rock from the watercourse. The service road associated with the power line will also need to cross the watercourse.

GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.* • Activity 24(ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. The access road will have a width of up to 10 metres.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 320 ha.
GNR. 327 (as amended in 2017)	Activity 56(ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. The access road will have a width of up to 10 metres.
GNR. 325 (as amended in 2017)	Activity 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."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 150 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of vegetation type the site falls within the Central Sandy Bushveld (Svcb 12) and the Dwaalboom Thornveld (SVcb 1) Vegetation units which is described by Mucina and Rutherford (2006) as 'Vulnerable' and 'Least threatened'. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 320 ha in extent.

GNR. 324 (as amended in 2017)	Activity 4 (e)(i)(ee)(gg)	• *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo province, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • Activity 4 (e)(i)(ee)(gg) is triggered as the access road will have a width of up to 10 meters. The internal and perimeter roads with a width of between 6 and 10 meters will be constructed and the development footprint is located within a CBA 1, ESA 1 and other natural areas (ONA) area. The project is located within 5 kilometres of the Sporting Chance Private Nature Reserve, Tortoiseshell Private Nature Reserve, Hou Moed Private Nature Reserve, Deon Private Nature Reserve and Hillhoff Private Nature Reserve as per the South Africa Protected Areas Database.
GNR. 324 (as amended in 2017)	Activity 10 (e)(i)	• *"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, (e) in the Limpopo province, (i) all areas."* • Activity 10(e)(i) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a capacity exceeding 30 but not exceeding 80 cubic metres. The project is located within the Limpopo Province.
GNR. 324 (as amended in 2017)	Activity 12 (e)(ii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (e) in the Limpopo province, (ii) within critical biodiversity areas identified in bioregional plans."* • Activity 12 (e)(i)(ii) is triggered since the proposed development is located in the Limpopo province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. In terms of vegetation type the site falls within the Central Sandy Bushveld (Svcb 12) and the Dwaalboom Thornveld (SVcb 1) Vegetation units which is described by Mucina and Rutherford (2006) as 'Vulnerable' and 'Least threatened'. The development footprint for the project overlaps with a CBA 1, ESA 1 and other natural areas

		(ONA) area. The development footprint of the solar power plant will be 320 ha ha in extent.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(e)(i)(ff)(hh)	• *"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; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; in the (e) Limpopo Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) Areas within 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve."* • Activity 14(ii)(a)(c)(e)(i)(ff)(hh) is triggered as the proposed water connection line and grid connection corridor crosses a channelled valleybottom wetland. The power line pylons associated with the line will be located either within 32 meters or within the feature itself and will have a footprint of more than 10 square meters. The service road associated with the power line will also need to cross the watercourse. The development footprint is located within a CBA 1, ESA 1 and other natural areas (ONA) area. The project is located within 5 kilometres of the Sporting Chance Private Nature Reserve, Tortoiseshell Private Nature Reserve, Hou Moed Private Nature Reserve, Deon Private Nature Reserve and Hillhoff Private Nature Reserve as per the South Africa Protected Areas Database.
GNR. 324 (as amended in 2017)	Activity 18 (e)(i)(ee)(gg)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1-kilometre (e) in the Limpopo province, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • Activity 18 (e)(i)(ee)(gg) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The project is located within the Limpopo Province and outside urban areas. The development footprint is located within a CBA 1, ESA 1 and other

		natural areas (ONA) area. The project is located within 5 kilometres of the Sporting Chance Private Nature Reserve, Tortoiseshell Private Nature Reserve, Hou Moed Private Nature Reserve, Deon Private Nature Reserve and Hillhoff Private Nature Reserve as per the South Africa Protected Areas Database.

The activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 and 324) for the project implies that the development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. According to Appendix 2 of Regulation 326 the objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

This Final Scoping Report has been submitted to the Department of Forestry, Fisheries and the Environment (DFFE) for review and comment. According to Regulation 326 all registered I&APs and relevant State Departments (including Organs of State) must be allowed the opportunity to review and provide comment on the scoping report. The Final Scoping Report has been made available to I&APs and all relevant State Departments. They have been requested to provide written comments on the report within 30 days of receiving it. All issues to be identified and comments received during the review period will be documented and compiled into a Comments and Response Report to be included as part of this Final Scoping Report. Where comments have

been received prior to the release of the Final Scoping Report for the 30-day review and comment period, these comments have been included in Appendix C5 and C6 and has also been included and responded to in the Comments and Responses Report (Appendix C7).

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the EIA and prepare all required reports. All correspondence to the EAP can be directed to:

Contact person:	Mr. Herman Alberts
EAPASA Registration:	2019/1328
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	063 685 2093 (Cell)
Electronic Mail:	herman@environamics.co.za

and

Contact person:	Ms. Christia van Dyk
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	078 470 5252 (Cell)
Electronic Mail:	christia@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the EIA. In terms of the independent status of the EAP a declaration is attached as Appendix A to this report. The expertise of the EAP responsible for conducting the EIA is also summarized in the curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix E to this report. The expertise of the specialists is also summarized in their respective reports.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail	Date of Repot
Geotechnical Feasibility Assessment (*to be included in the EIA Report*)	To be Confirmed	-	-	-	-	(to be included in the EIA Report)
Avifaunal Impact Assessment	The Biodiversity Company	Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com	Nov 2022
Terrestrial Biodiversity, and Wetland Impact Assessments	The Biodiversity Company	Marnus Erasmus / Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com	Jan 2023
Heritage Impact Assessment	APELSER ARCHAEOLOICAL CONSULTING - APAC	A. Pelser	P.O.BOX 73703, LYNNWOOD RIDGE, 0040	Cell: 083 459 3091	apac.heritage@gmail.com	Dec 2022
Paleontological Study	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	elizebutler002@gmail.com	Feb 2023
Soil and Agricultural Impact Assessment	The Biodiversity Company	Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com	Jan 2023
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	johan@donnawayl.co.za	Feb 2023
Social Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Cell: 082 493 5166	johan@donnawayl.co.za	Jan 2023
Transport Impact Assessment Study	iWink Consulting	Iris Wink	Plattekloof Glen Cape Town		Iris@iwink.co.za	Feb 2023

1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 326. Table 1.3 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted by the EAP on 28 September 2022.
- Site notices were erected on site on 28 September 2022 informing the public of the commencement of the EIA process.
- A newspaper advertisement was placed in the Platinum Bushvelder on 14 October 2022, informing the public of the EIA process and for the public to register as I&APs.
- A pre-application meeting request was submitted to DFFE and the meeting was held via Microsoft Teams on 04 April 2023.
- An application form and the Final Scoping Report has been submitted to DFFE on 08 May 2023.
- The Final Scoping Report has been made available for a 30-day review and comment period from 08 May 2023 to 07 June 2023.

It is envisaged that the Final Scoping Report will be submitted to the Department in June 2023 and that the Final Scoping Report will be accepted by the Department in July 2023. The EIA process should be completed within approximately nine months of submission of the Final Scoping Report, i.e. by January 2024 – see Table 1.3.

Table 1.3: Estimated timeframe for completion of the 'scoping and EIA process'

Activity	**Prescribed timeframe**	**Timeframe**
Site visit		September 2022
Public participation (BID)	30 Days	30 Sept. – 01 Nov. 2022
Submit application form and DSR	-	08 May 2023
Public participation (DSR)	30 Days	08 May. 2023– 07 Jun. 2023
Submit FSR	44 Days	June 2023
Department acknowledges receipt	10 Days	June 2023
Department approves/reject	43 Days	By end July 2023

Public participation (DEIR)	30 Days	July 2023
Submission of FEIR & EMPr	-	August 2023
Department acknowledges receipt	10 Days	August 2023
Decision	107 Days	Dec. 2023
Department notifies of decision	5 Days	Dec. 2023
Registered I&APs notified of decision	14 Days	Dec. 2023
Appeal	20 Days	Jan. 2024

1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT

The table included below provides an indication of the specialist studies identified by the DFFE Screening Tool Report (Appendix B), an indication of whether the studies were undertaken or not and a motivation or confirmation of the studies being included or not.

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Appendix
Agricultural Impact Assessment Sensitivity: Very High	Yes	An Agriculture Potential Assessment is included in Appendix E4. The high sensitivity is disputed by the report.
Landscape / Visual Impact Assessment Sensitivity: Very High	Yes	A Visual Impact Assessment is included in Appendix E3.
Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment is included in Appendix E5.
Palaeontological Impact Assessment Sensitivity: High	Yes	A Palaeontological Impact Assessment is included in Appendix E6.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Terrestrial Biodiversity Assessment Report is included in Appendix E1.

		This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Wetland Assessment Report is included in Appendix E9. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Avian Impact Assessment Sensitivity: Low	Yes	Avifauna Impact Assessment Report is included as Appendix E2. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Civil Aviation Assessment Sensitivity: Medium	No	Study not included. Refer to section 2 of this report for site verification.
Defence Theme Sensitivity: Low	No	Study not included. Refer to section 2 of this report for site verification.
RFI Assessment Sensitivity: Medium	No	Study not included. Refer to section 2 of this report for site verification.
Geotechnical Assessment Sensitivity: Not indicated	No	The Geotechnical Assessment will be conducted before construction begins as part of the micro-siting of the facility layout. The consideration of geotechnical aspects is considered to be of a technical concern rather than an environmental concern.
Plant species Assessment Sensitivity: Low	Yes	Refer to Appendix E1. The Terrestrial Biodiversity Impact Assessment also includes the relevant Plant Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

Animal Species Assessment Sensitivity: Medium	Yes	Refer to Appendix E1. The Terrestrial Biodiversity Impact Assessment also includes the relevant Animal Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 2 of Regulation No.326. It consists of eight sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: Structure of the report

Requirements for the contents of a scoping report as specified in the Regulations		Section in report
(a)	details of -	1
	(i) the EAP who prepared the report; and	
	ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	

(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered;	
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.	
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	3
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including –	5
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) the outcome of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(g)	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6

	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
(i)	a plan of study for undertaking the environmental impact assessment process to be undertaken, including-	8
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	
	(ii) a description of the aspects to be assessed as part of the EIA process;	
	(iii) aspects to be assessed by specialists;	
	(iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists;	
	(v) a description of the proposed method of assessing duration and significance;	
	(vi) an indication of the stages at which the competent authority will be consulted;	
	(vii) particulars of the public participation process that will be conducted during the EIA process; and	
	(viii) a description of the tasks that will be undertaken as part of the EIA process;	
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	
(j)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix C5 – C7 to the report
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	(iii) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	

(k)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and I&APs on the plan of study for undertaking the EIA;	
(l)	where applicable, any specific information required by the CA; and	N/A
(m)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 ACTIVITY DESCRIPTION

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(b) the location of the activity, including-

(i) the 21-digit Surveyor General code of each cadastral land parcel;

(ii) where available, the physical address and farm name;

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity applied for at an appropriate scale, or, if it is-

(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including-

(i) all listed and specified activities triggered;

(ii) a description of the activities to be undertaken, including associated structures and infrastructure.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a photovoltaic solar facility and associated infrastructure on Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province situated within the Thabazimbi Local Municipality area of jurisdiction. The proposed development is in the Limpopo Province in the northern interior of South-Africa (refer to Figure B for the regional map). The town of Northam is located approximately 2km to the north of the proposed development (refer to Figure A for the locality map).

The project entails the generation of up to 150MW electrical power through the installation and operation of photovoltaic (PV) panels. An area of 645ha has been assessed as part of this Scoping Report, and an area of 320ha have been identified as the development footprint for the placement of the infrastructure (including supporting infrastructure on site). Refer to Table 2.1 for general site information.

The property on which the facility is to be constructed will be leased by Vanadium Solar Power Plant (RF) (Pty) Ltd from the property owner, Interswart Ingenieursdienste Pty Ltd and Tortillis Boerdery (Pty) Ltdfor the life span of the project (minimum of 20 years).

It is expected that generation from the facility will tie in with a newly proposed collector substation to be connected to the national grid via one of the existing Eskom 275kV or 400kV lines from Spitskop 400/275/88/kV MTS Substation. The grid connection route will be assessed within 15 km long and a 150m wide (up to 1 km wide in some instances) corridor.

Table 2.1: General site information

Description of affected farm portion	Solar Power Plant Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421 Power Line Portion 2 of Zwartdoorns No. 421 Portion 1 of the farm Makayskraal No. 18, Portion 1 of the farm Tusschenkomst No. 15 Portion 2 of the farm Tusschenkomst No. 15 Remaining Extent of the farm Nooitgedacht No. 11 Portion 1 of the farm Nooitgedacht No. 11 Remaining Extent of the Farm Morewag No. 921
Province	Limpopo
District Municipality	Waterberg District Municipality
Local Municipality	Thabazimbi Local Municipality
Ward numbers	7
Closest towns	Northam is located approximately 2km north of the proposed development.
21 Digit Surveyor General codes	Solar Power Plant Portion 1 of the farm Makayskraal No. 18 T0JQ00000000001800001 Portion 2 of the farm Zwartdoorns No. 421 T0KQ00000000042100002 Power Line Portion 2 of the farm Zwartdoorns No. 421 T0KQ00000000042100002

	Portion 1 of the farm Makayskraal No. 18 T0JQ00000000001800001 Portion 1 of the farm Tusschenkomst No. 15 T0JQ00000000001500001 Portion 2 of the farm Tusschenkomst No. 15 T0JQ00000000001500002 Remaining Extent of the farm Nooitgedacht No. 11 T0JQ00000000001100000 Portion 1 of the farm Nooitgedacht No. 11 T0JQ00000000001100001 Remaining Extent of the Farm Morewag No. 921 T0JQ00000000092100000
Type of technology	Photovoltaic solar facility
Structure Height	- Panels ~6m - Buildings ~ 6m - Power line ~32m - Battery storage facility ~ 8m
Surface area to be covered (Development footprint)	Approximately 320 ha
EIA Footprint (Area to be assessed)	Assessed as 645 ha
Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is in order to capture the most sun.
Generation capacity	Up to 150MW

The site is located outside an urban area and is bordered by agricultural land uses. The site survey revealed that the affected property currently consists of agricultural activities – refer to plates 1-11 for photographs of the affected property and proposed development footprint area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 9(i)	• *The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—(i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more"* • Activity 9 (i) is triggered since the proposed photovoltaic solar facility will require a new water connection line to the facility. The water connection line will exceed 1000 metres in length with an internal diameter of at least 0.36 metres.
GNR. 327 (as amended in 2017)	Activity 11(ii)	• *"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."* • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132kV), an on-site HV/MV substation and switching station (132kV). It is expected that generation from the facility will tie in with one of the existing Eskom 275kV or 400kV lines from Spitskop 400/275/88/kV MTS Substation.
GNR. 327 (as amended in 2017)	Activity 12(ii)(a)(b)	• *"The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."* • Activity 12(ii)(a)(b) is triggered as the proposed water connection line and grid connection corridor crosses a channelled valleybottom wetland. The power line pylons associated with the line will be located either within 32 meters or within the feature itself and will have a footprint of more than 100 square meters. The service road associated with the power line will also need to cross the watercourse.

GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel) in containers with combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres.
GNR. 327 (as amended in 2017)	Activity 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."* • Activity 19 is triggered as the proposed water connection line and grid connection corridor crosses a channelled valleybottom wetland. The power line pylons associated with the line will be located within the feature itself and will require the removal of more than 10 cubic meters of rock from the watercourse. The service road associated with the power line will also need to cross the watercourse.
GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.* • Activity 24(ii) is triggered as the access road will be up to 10 metres in width. The internal roads and the perimeter road will be between 4 and 6 metres in width.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 562 hectares.
GNR. 327 (as amended in 2017)	Activity 56(ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need

		to be widened by more than 6 metres. The access road will have a width of up to 10 metres.
GNR. 325 (as amended in 2017)	Activity 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."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 150 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of vegetation type the site falls within the Central Sandy Bushveld (Svcb 12) and the Dwaalboom Thornveld (SVcb 1) Vegetation units which is described by Mucina and Rutherford (2006) as 'Vulnerable' and 'Least threatened'. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 562ha in extent.
GNR. 324 (as amended in 2017)	Activity 4 (e)(i)(ee)(gg)	• "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo province, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • Activity 4 (e)(i)(ee)(gg) is triggered as the access road will have a width of up to 10 meters. The internal and perimeter roads with a width of between 6 and 12 meters will be constructed and the development footprint is located within a CBA 1, ESA 1 and other natural areas (ONA) area. The project is located within 5 kilometres of the Sporting Chance Private Nature Reserve, Tortoiseshell Private Nature Reserve, Hou Moed Private Nature Reserve, Deon Private Nature Reserve and Hillhoff Private Nature Reserve as per the South Africa Protected Areas Database.
GNR. 324 (as amended in 2017)	Activity 10 (e)(i)	• *"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, (e) in the Limpopo province, (i) all areas."*

		• Activity 10(e)(i) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a capacity exceeding 30 but not exceeding 80 cubic metres. The project is located within the Limpopo Province.
GNR. 324 (as amended in 2017)	Activity 12 (e)(ii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (e) in the Limpopo province, (ii) within critical biodiversity areas identified in bioregional plans."* • Activity 12 (e)(i)(ii) is triggered since the proposed development is located in the Limpopo province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. In terms of vegetation type the site falls within the Central Sandy Bushveld (Svcb 12) and the Dwaalboom Thornveld (SVcb 1) Vegetation units which is described by Mucina and Rutherford (2006) as 'Vulnerable' and 'Least threatened'. The development footprint for the project overlaps with a CBA 1, ESA 1 and other natural areas (ONA) area. The development footprint of the solar power plant will be 562ha in extent.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(e)(i)(ff)(hh)	• *"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; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; in the (e) Limpopo Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) Areas within 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve."* • Activity 14(ii)(a)(c)(e)(i)(ff)(hh) is triggered as the proposed water connection line and grid connection corridor crosses a channelled valleybottom wetland. The power line pylons associated with the line will be located either within 32 meters or within the feature itself and will have a footprint of more than 10 square meters. The service road associated with the power line will also need to cross the watercourse. The development

		footprint is located within a CBA 1, ESA 1 and other natural areas (ONA) area. The project is located within 5 kilometres of the Sporting Chance Private Nature Reserve, Tortoiseshell Private Nature Reserve, Hou Moed Private Nature Reserve, Deon Private Nature Reserve and Hillhoff Private Nature Reserve as per the South Africa Protected Areas Database.
GNR. 324 (as amended in 2017)	Activity 18 (e)(i)(ee)(gg)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (e) in the Limpopo province, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • Activity 18 (e)(i)(ee)(gg) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The project is located within the Limpopo Province and outside urban areas. The development footprint is located within a CBA 1, ESA 1 and other natural areas (ONA) area. The project is located within 5 kilometres of the Sporting Chance Private Nature Reserve, Tortoiseshell Private Nature Reserve, Hou Moed Private Nature Reserve, Deon Private Nature Reserve and Hillhoff Private Nature Reserve as per the South Africa Protected Areas Database.

The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- <u>Site clearing and preparation:</u> Certain areas of the site and access road will need to be cleared of vegetation and some areas may need to be levelled.

- <u>Civil works to be conducted:</u>

- Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
- Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
- Construction of access and inside roads/paths – existing paths will be used where reasonably possible. Access will be obtained via a gravel road off the R501 regional road traversing the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Additionally, the turning circle for trucks will also be taken into consideration.

- Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layers where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e. semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce up to 150MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the Yield.

- Wiring to Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed power line. Generation from the facility will tie in with a newly proposed collector substation to be connected to the national grid via one of the existing Eskom 275kV or 400kV lines from Spitskop 400/275/88/kV MTS Substation . The connection power line will be constructed within the limits of the grid connection corridor. The grid connection route will be assessed within 15 km long and a 150m wide (up to 1 km wide in some instances) corridor. The Project will inject up to 150MW into the National Grid. The installed capacity will be approximately 150MW.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.

- Supporting Infrastructure – All associated infrastructure will be constructed within the limits of the infrastructure and ancillary complex. The associate infrastructure includes laydown areas, IPP Substation, Eskom Substation, BESS, Operations and Maintenance buildings.

- Battery storage – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,740 m^3 of batteries and associated operational, safety and control infrastructure.

- Roads – Access will be obtained via a gravel road off the R501 regional road traversing the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan will consider and adhere to the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site – refer to Figure G and H. The total surface area proposed for the layout includes the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power line, battery energy storage system, on-site substation and switching station and perimeter fences). Limited features of environmental significance exist on site, however the sensitivities that do exist have to be avoided in the layout of the solar facility (refer to Figure G and H). Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	320 Hectares (Development footprint)
Number of inverters required	Minimum 50
Area occupied by inverter / transformer stations / substations / BESS	All associated infrastructure will be constructed within the limits of the infrastructure and ancillary complex. Substation: 3,35 ha Central inverters + LV/MV trafo: 750 m^2
Capacity of on-site substation	132kV
Capacity of the power line	132kV
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 320 Hectares Construction Laydown Area: TBC
Area occupied by buildings	Infrastructure and ancillary complex 1: 20 ha Infrastructure and ancillary complex 2: 10.6 ha
Battery storage facility	Max Volume ~ 1740 m^3 Max height ~ 8 m; Capacity ~ Up to 500 MWh

Length of access roads (Service)[1]	Service Road 1 Length: 1.5 km Service Road 2 Length: 11.3 Km
Width of access roads (Services)	8 m – 10 m
Length of internal roads	TBC
Width of internal roads	4 m – 6 m
Length of perimeter roads	13.76 km
Width of perimeter roads	6 m – 8 m
Grid connection corridor width	150 m (up to 1km in some instances)
Grid connection corridor length	Up to ~11 km
Power line servitude width	32 meters
Height of fencing	Approximately 2.5 meters

Table 2.4 provide the coordinate points for the proposed project site, associated infrastructure and grid connection corridor.

Table 2.4: Coordinates

Coordinates			
Project Site	A	25° 1'25.51"S	27°19'51.36"E
	B	25° 1'32.05"S	27°20'12.94"E
	C	25° 1'20.74"S	27°20'57.56"E
	D	25° 1'21.48"S	27°20'57.91"E
	E	25° 1'14.31"S	27°21'26.69"E
	F	25° 1'13.68"S	27°21'32.68"E
	G	25° 1'13.96"S	27°21'37.51"E
	H	25° 1'14.13"S	27°21'38.79"E
	I	25° 1'15.29"S	27°21'43.42"E
	J	25° 1'16.77"S	27°21'47.17"E
	K	25° 1'47.36"S	27°22'45.53"E
	L	25° 2'4.59"S	27°21'53.27"E
	M	25° 2'22.58"S	27°19'48.67"E
Service Road 1	1	25° 1'47.12"S	27°22'45.83"E
	2	25° 1'56.36"S	27°22'17.82"E
	3	25° 2'4.44"S	27°21'53.27"E
Service Road 2	1	25° 1'13.60"S	27°21'38.19"E
	2	25° 2'4.48"S	27°21'53.10"E
	3	25° 2'31.16"S	27°18'48.87"E
	4	25° 2'11.98"S	27°16'19.13"E
	5	25° 2'16.76"S	27°16'11.57"E

[1] Note from the developer: Access will be obtained from any point along the service roads.

Infrastructure & Ancillary Complex 1	A	25° 2'3.08"S	27°20'17.29"E
	B	25° 2'3.08"S	27°20'34.61"E
	C	25° 2'15.50"S	27°20'34.68"E
	D	25° 2'17.43"S	27°20'21.27"E
	E	25° 2'12.46"S	27°20'17.31"E
Infrastructure & Ancillary Complex 2	A	25° 1'31.55"S	27°20'17.16"E
	B	25° 1'29.28"S	27°20'26.47"E
	C	25° 1'45.34"S	27°20'26.47"E
	D	25° 1'41.62"S	27°20'17.20"E
Grid Connection Corridor	A	25° 1'42.13"S	27°22'34.24"E
	B	25° 1'47.63"S	27°22'44.71"E
	C	25° 2'4.60"S	27°21'53.22"E
	D	25° 2'31.28"S	27°18'48.84"E
	E	25° 2'14.71"S	27°16'39.40"E
	F	25° 2'24.90"S	27°16'5.83"E
	G	25° 1'53.05"S	27°15'47.03"E
	H	25° 1'49.07"S	27°15'8.22"E
	I	25° 1'30.44"S	27°14'0.31"E
	J	25° 1'17.25"S	27°14'4.02"E
	K	25° 1'36.15"S	27°15'10.65"E
	L	25° 1'47.18"S	27°16'22.24"E
	M	25° 2'9.41"S	27°16'36.04"E
	N	25° 2'26.31"S	27°18'48.93"E
	O	25° 2'0.47"S	27°21'47.31"E
	P	25° 1'56.52"S	27°21'46.15"E
	Q	25° 1'52.74"S	27°22'1.29"E

2.5 SERVICES PROVISION

The following sections provides information on services required on the site e.g. water, sewage, refuse removal, and electricity.

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources or alternatively collected with water trucks from an authorized water service provider and stored on site. A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has obtained preferred bidder status by the Department of Mineral Resources and Energy.

The estimated maximum amount of water required during construction is 45 000 m^3 annually during the 18 - 24 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 7000m^3 per annum. Much of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning.

It is estimated that the panels may only need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September).

Drinking water supplied will comply with the SANS:241 quality requirements. Water quality from the borehole will be tested to confirm SANS:214 quality, if water quality is not sufficient for drinking, bottled water will be supplied to staff during construction and operational phases of the project.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of stormwater, the capture and use of rainwater from gutters and roofs will be considered by the developer. Furthermore, indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Stormwater management and mitigation measures will be included in the Environmental Management Programme (EMPr) to be submitted as part of the EIR.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Waste will be disposed of at a licensed landfill site. The construction- and hazardous waste will be removed and disposed of at licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality. The relevant Local Municipality(s) have been contacted, to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years). The Developer still awaits confirmation. This will be provided during the EIA Phase.

2.5.4 Electricity

During the construction phase of the development, electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the farm will be utilised. This will depend on the Engineering, Procurement, and Construction (EPC) contractor appointed. During operation electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs will be considered by the developer. During the day, electricity will be sourced from the photovoltaic plant, and from the electricity connection at night.

2.6 Decommissioning of the facility

The operating period will be 20 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures to improve the efficiency of the facility as the technology improves. The specifications of these new panels will be the same as the current panels under consideration, but the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that are the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase.

The decommissioning process will consist of the following steps:

- The PV facility would be disconnected from the Eskom grid.
- The BESS, inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- Wastewater storage conservancy tank would be responsibly removed and area would be rehabilitated.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

The rehabilitation of the site would form part of the decommissioning phase. The aim would be to restore the land to its original form (or as close as possible). The rehabilitation activities would include the following:

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and
- Restoration of the surface to the original contours and application of hydro seeding.

3 LEGISLATIVE AND POLICY CONTEXT

This section aims to address the following requirements of the regulations:

> **Appendix 2.** (2) A scoping report (...) must include-
>
> (e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries and the Environment (DFFE) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in the IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The National Forests Act, 1998 (Act 84 of 1998)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030

- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Limpopo Provincial Spatial Development Framework (PSDF) (2016)
- Waterberg District Municipality Final Integrated Development Plan (IDP) 2020 – 2021 (2020)
- Thabazimbi Local Municipality Final Integrated Development Plan 2020-2021 (2020)
- Thabazimbi Local Municipality Local Municipality Spatial Development Framework (2018)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 3.1 and 3.2 to provide a reference framework for the implications for the proposed activity.

3.2 LEGISLATIVE CONTEXT

Table 3.1: Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa **(Act No. 108 of 1996)**	National Government	1996	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that "everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people's environmental right and places government under a legal duty to act as a responsible custodian of the country's environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development. The development of the Vanadium Solar Power Plant and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.
The National Environmental Management Act **(Act No. 107 of 1998)**	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) and the Limpopo	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.

	Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. The EIA process undertaken for the Vanadium Solar Power Plant is in-line with the requirements of NEMA for the Application for Environmental Authorisation.
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble). Considering that the Vanadium Solar Power Plant is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.
The National Water Act (Act No. 36 of 1998)	Department of Water Affairs (now known as Department of Water and Sanitation)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The site is located within the A23G quaternary catchment and is situated in the Apies/Pienaar Water Management Area. Drainage occurs as sheet-wash into the drainage channels on site

			that eventually drains into the major river namely the Pienaars River that occurs to the south of the project area. Also, should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license.
National Environmental Management: Waste Act **(Act No. 59 of 2008)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered.
National Environment Management: Air Quality Act **(Act No. 39 of 2004)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.

The National Heritage Resources Act **(Act No. 25 of 1999)**	South African Heritage Resources Agency (SAHRA)	1999	The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS for the Vanadium Solar Power Plant and all relevant documents were submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix E5, and the Palaeontological Impact Assessment is included as Appendix E6.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long term lease agreement.

			A Soils and Agricultural Assessment has been undertaken for the Vanadium Solar Power Plant and is included as Appendix E4.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. A Terrestrial Biodiversity, Plant and Animal Species Impact Assessment has been undertaken for the Vanadium Solar Power Plant and is included in Appendix E1.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the construction of photovoltaic solar plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The White Paper on the Energy Policy of the Republic of South Africa	Department of Mineral Resources and Energy	1998	The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives: • Increasing access to affordable energy services • Improving energy governance • Stimulating economic development • Managing energy-related environmental and health impacts • Securing supply through diversity • Energy policy priorities The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive, and many appropriate applications exist. The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include: • Minimal environmental impacts in operation in comparison with traditional supply technologies; and • Generally lower running costs, and high labour intensities. Disadvantages include: • Higher capital costs in some cases; • Lower energy densities; and

			• Lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. The Vanadium Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.
The White Paper on Renewable Energy	Department of Mineral Resources and Energy	2003	This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix). The Vanadium Solar Power Plant is in line with this paper as it proposes the generation of renewable energy from the solar resource.
Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a "living plan" which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030. "*This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation".* In addition to all existing and committed power plants, the RBS included 11,4 GW of

renewables, which relates to the proposed Vanadium Solar Power Plant. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options (RSA, 2011a).

The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that:

"*The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry*; *To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP; The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS*" (RSA, 2011a:6).

"The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources" (RSA, 2011a:6).

The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is: "*Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment."*

"*Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed*" (IRP, 2011a:17).

In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP was updated and was open for

comments until March of 2017. The new IRP of 2019 was formally published in October 2019. For the revision scenario, analysis was conducted. The results revealed that for the period ending 2030 that: *"The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025"; "Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030*"; and *"the scenario without renewable energy annual build limits provides the least-cost option by 2030*" (RSA, 2018:34).

Lastly, the Final IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: "*Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050*" (RSA, 2018:34–35).

In the final IRP of 2019 key considerations were taken into account together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *"The application of renewable build limits 'smoothes out' the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence*". The decision stated against this key consideration is to *"retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan"* (RSA, 2019:46). Hereby the IRP also recognises renewable technologies' potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13).

The Vanadium Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.

National Development Plan of 2030	The Presidency: National Planning Commission	-	The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a Final national development plan was Finaled, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely, to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge. The development of the Vanadium Solar Power Plant will contribute to the intervention strategy as identified within the plan.
National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretch over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow: - SIP 8: Green energy in support of the South African economy; - SIP 9: Electricity generation to support socio-economic development; and - SIP 10: Electricity transmission and distribution for all. SIP 8 according to the Plan "*support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production*

		facilities". The purpose of SIP 9 according to the Plan is to "*accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances*". SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" (RSA, 2012:20). The Vanadium Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource which supports socio-economic development and will contribute to meeting the electricity demand of the country as set out in this plan.
New Growth Path Framework	Department of - Economic Development	The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b). This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy in the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to: - Identify the possible areas of employment creation; and - Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b). This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term.

			Considering that the construction of and investment in renewable energy is a key area identified within the framework, the Vanadium Solar Power Plant is considered to be in-line with the framework.
Climate Change Bill	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2018	On 08 June 2018 the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill: • Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; • Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response; • Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner. The Vanadium Solar Power Plant comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Climate Change Bill	National Department of Forestry, Fisheries and the Environment	2021	The Department of Forestry, Fisheries and the Environment has published a new Climate Change Bill for public comment. The bill notes that climate change represents an urgent threat to human societies and the planet, and requires an effective, progressive and incremental response from both government and citizens. It recognises that South Africa has a global responsibility to reduce greenhouse gasses and that the anticipated impacts arising as a result of climate change have the potential to undermine achieving of the country's developmental goals.

			The main objective of the bill is to enable the development of an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society, and to provide for matters connected therewith. The Vanadium Solar Power Plant comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee	2010 - 2030	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility: • SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. • SIP 9: Electricity generation to support socio-economic development: The proposed Vanadium Solar Power Plant is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Mineral Resources and Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. The Vanadium Solar Power Plant could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs

Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2014	The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit. The Vanadium Solar Power Plant is not located within a REDZ, but the development will contribute to the expansion of renewable energy facilities and infrastructure within the country, and provide the positive opportunities associated with it.
Limpopo Provincial Spatial Development Framework (PSDF)	Limpopo Provincial Government	2014	The formulation of a Spatial Development Framework, being a *macro spatial plan* for the Limpopo province and its municipalities requires some statement on the spatial development objectives which guided the formulation of the macro spatial plan and hierarchy of settlements. The main objective with the provincial SDF was to formulate a spatial framework which would guide and encourage equitable distribution of investment in terms of a functional settlement hierarchy, to achieve spatially balanced development across the Limpopo Province and support investment in sustainable

settlements. Other spatial development objectives which guided the formulation of the macro spatial plan as well as policy and strategy formulation for implementation are:

- The review and confirmation of the hierarchy of settlements (both towns and villages) by establishing an optimal and functional spatial pattern for districts and thus the Limpopo Province over time.
- Rationalize and promote the optimal use of land and protection of natural resources by considering high/moderate potential agricultural areas, high/moderate environmental sensitivity areas and mining/mineral deposit areas as well as other relevant factors.
- The establishing of a functional spatial pattern with a hierarchy of settlements which provides a sound basis for long term sustainable economic growth to amongst others increase income and employment in both the formal and informal sectors in urban, as well as rural areas.
- Provide guidelines for the development of transportation and utility networks to strengthen the functional linkages between settlements in terms of a hierarchy of settlements; and
- The successful integration of planning on macro (national and provincial) level and micro (district and local municipality) level.

Secondary objectives pertaining to the Environmental aspects and Agricultural potential of soils, namely:

The objectives of adding an environmental perspective to the spatial framework are:

- To ensure that resources in the province are used to their fullest potential in promoting, protecting, and managing a sustainable environment.

To include information contained in available databases to assist with decision making at strategic and project level assist in decision-making.

The development of the Vanadium Solar Power Plant is in-line with the framework based on the contributions and opportunities presented by a development of this nature.

Waterberg District Municipality Integrated Development Plan (IDP)	Waterberg District Municipality	2020-2021	The Integrated Develop Planning is a mandatory and over aching process run collectively by all role players within the municipality to achieve developmental objectives of local government. Developmental Local Government has an obligation to provide basic services through an interaction between numerous stakeholders within the municipal area. It is through this collective interaction commonly known as the "The Theatre of planning" that we intend to address service delivery challenges facing the municipality and our communities The vision of the Waterberg DM is to be "A developmental municipality dedicated to the social and economic upliftment of its communities." The Mission Statement is: "To ensure effective utilization of economic resources to address socio–economic imperatives through mining, agriculture and tourism". The above vision and mission statements are supported by certain values that drive the attitudes and behaviour of politicians and administration of the Waterberg District Municipality are confirmed as: • Honesty • Respect • Fairness • Integrity • Accountability • Accessibility • Effectiveness • Ubuntu The development of the Vanadium Solar Power Plant is in line with the plan, considering the relevant Key Performance Area stated in the IDP.

Thabazimbi Local Municipality Final Integrated Development Plan (IDP)	Thabazimbi Local Municipality	2020-2021 (2020)	The IDP for the municipality is the instrument for the strategic management of the Municipality and decision-making by Council. The IDP ensures a cooperative approach by the National, Provincial and Local spheres of government to develop and implement projects and programmes on a Priority basis which will empower and benefit the community. The IDM highlights the vision and mission statements of the LM that they strive to achieve. The vision of the municipality is to be "a leading eco-tourism Municipality in the provision of sustainable and excellent services". The vision is supported by the mission statement the is "Promote, co-ordinate, implement the financial and environmental growth and development through a committed staff and partnership with communities and stakeholders". To further support the vision and mission statements, certain values was identified namely: • Accountable • Transparent • Community Centred • Honest Human Capital. • A safe, healthy and prosperous environment. The development of the Vanadium Solar Power Plant will contribute to the goals of the area, albeit to a limited extent.
Thabazimbi Local Municipality Municipal Spatial Development Framework (SDF)	Thabazimbi Local Municipality	2018	Spatial Rationale seeks to strengthen and create sustainable human settlements through application of spatial planning and land use systems and practices. The Municipality intends to embark on a process of reviewing its Spatial Development Framework 2015 (SDF) and Town Planning Scheme 2014 which must be aligned to Spatial Planning and Land Use Management Act, Act 16 of 2013 (SPLUMA) and its Regulations. The Municipal Systems Act, 2000 mandates the incorporation of the SDF into the IDP as a sector plan with the intension to provide spatial direction. it is therefore important that the SDF and the IDP are aligned. The Limpopo Spatial Development Framework and existing SDF identified the following nodal areas in the Thabazimbi Municipal Area, namely the (i.) Provincial Growth Point (PGP) being the Thabazimbi Town, and

(ii.) Municipal Growth Point (MGP) being the Northam Town. Both of these towns play a critical role in the sustenance of the municipality both spatially and economically.

The contents of the SDF for the municipality are as follows:

- include a written and spatial representation of a five-year spatial development plan for the spatial form of the municipality;
- include a longer-term spatial development vision statement for the municipal area which indicates a desired spatial growth and development pattern for the next 10 to 20 years; identify current and future significant structuring and restructuring elements of the spatial form of the municipality, including development corridors, activity spines and economic nodes where public and private
- include a strategic assessment of the environmental pressures and opportunities within the municipal area,
- including the spatial location of environmental sensitivities, high potential agricultural land and coastal access strips, where applicable;
- identify the designation of areas in which—more detailed local plans must be developed; and shortened land use development procedures may be applicable and land use schemes may be so amended; provide the spatial expression of the coordination, alignment and integration of sectoral policies of all municipal departments;
- determine the purpose, desired impact and structure of the land use management scheme to apply in that municipal area; and include an implementation plan comprising of sectoral requirements, including budgets and resources for implementation;
- necessary amendments to a land use scheme;
- specification of institutional arrangements necessary for implementation;
- specification of implementation targets, including dates and monitoring indicators; and specification, where necessary, of any arrangements for partnerships in the implementation process

Since the SDF is still under review, the solar power plant may in the future contribute to the accomplishment of some of the objectives listed above, albeit to a limited extent.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

- Planning legislation governing the rezoning process and approval of the layout plan.
- Design standards and legislation for services provision such as water, sewerage, electricity, etc.
- Municipal bylaws related to building plans, building regulations, etc.

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)[2]
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Final National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEA, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations

[2] Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that the EPs will need to be complied with should funding for the project be required.

- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

3.6 CONCLUSION

The EIA was undertaken in accordance with the EIA Regulations (as amended) published in GNR 326, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed development, as well as an indication of the need and desirability of the proposed development from a national, provincial and local level. For this reason, the proposed development project will be assessed in terms of its fit with the key legislative, policy and planning documents discussed above.

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the development of the Vanadium Solar Power Plant. The White Paper on the Energy Policy of the Republic of South Africa of 1998 stated that due to the fact that renewable energy resources operate from an unlimited resource base, i.e. the sun, renewable energy can increasingly contribute towards a long-term sustainable energy supply for future generations. This policy further highlights that due to the unlimited resources base of renewable energy in South Africa, renewable energy applications, like PV solar energy and associated infrastructure, are more sustainable in terms of social and environmental costs. The Integrated Resource Planning for Electricity for South Africa of 2010–2030, the National Infrastructure Plan of South Africa and the New Growth Path Framework all support the development of the renewable energy sector. In particular, the IRP also indicated that 43% of the energy generation in South Africa is allocated to renewable energy applications. On a District and Local level limited attention is given explicitly to renewable sources like PV solar energy, however the documents reviewed do make provision for such developments and efficiency in improving the quality of lives in terms of efficient physical infrastructure as well as socio-economic growth. At Provincial, District and Local level the policy documents support the applications of renewables.

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed Vanadium Solar Power Plant is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include – (f) a motivation for the need and desirability of the activity in the context of the preferred location.

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO2 emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 an article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (source: https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes / opportunities. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result it was confirmed that several new generation projects will be coming online over the next few years.

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the Final IRP 2018 as per table 4.1 below:

Table 4.1: Published Final IRP 2018 (Approved by Cabinet for Consultation)

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The facility's contribution towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Limpopo Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business

opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment. The location of the proposed development within the Thabazimbi Local Municipality is desirable since 14% of households within the Municipality have no income (Thabazimbi IDP, 2020/2021).

- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.

- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.

- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies).

- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.

- Reduced environmental impacts - The reduction in non-renewable electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.

- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the power plant. In future, this experience can be employed at other similar solar installations in South Africa.

- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 800 employment opportunities will be created during the construction and operational phases.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Because of predominantly the climate and soil limitations, the site is totally unsuitable for cultivated crops, and the viable agricultural land use is limited to grazing only. The proposed development in this specific area will generate alternative land use income through rental for the proposed energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: According to the Thabazimbi LM IDP, the national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.
- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(h) a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including –

(i) details of all the alternatives considered;

(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.

(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(ix) the outcome of the site selection matrix;

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and

(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;

5.1 CONSIDERATION OF ALTERNATIVES

The DEAT 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal.

An initial site assessment was conducted by the developer Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province and the farm was found favorable due to its close proximity to grid connections, solar radiation, ecology and relative flat terrain. Some parts of the farm have been deemed not suitable for the proposed development such as areas under cultivation. Where specific features of environmental sensitivity are identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers will be considered by the developer to ensure that the facility layout is appropriate considering the sensitive features present. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site within the affected property. A single alternative site on the same farm has been identified by the developer.

The following sections explore different types of alternatives in relation to the proposed activity in more detail.

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

5.1.2 Location alternatives

No other properties have at this stage been secured by Vanadium Solar Power Plant (RF) (Pty) Ltd in the Northam area to potentially establish the Vanadium Solar Power Plant. From a local perspective Portion 1 of the farm Makayskraal No. 18 and Portion 2 of the farm Zwartdoorns No. 421 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

Provision will be made in this scoping report to consider the results of the specialist studies to exclude the sensitive areas present, which includes the no-go buffer areas recommended by the specialist. The sensitive areas and associated buffers will be considered by the developer for the facility layout design to optimise the layout for avoidance of the environmental sensitivities identified.

As part of the specialist studies undertaken, areas that will need to be avoided has been identified which includes drainage channels and other surface water/wetland features present within the development footprint. The development footprint is however large enough to enable the avoidance of the sensitive features and the associated buffers by the facility layout and still provide an opportunity for the successful development and operation of the Vanadium Solar Power Plant from a technical perspective.

Therefore, a single preferred location alternative was assessed – refer to Figures 5.1.

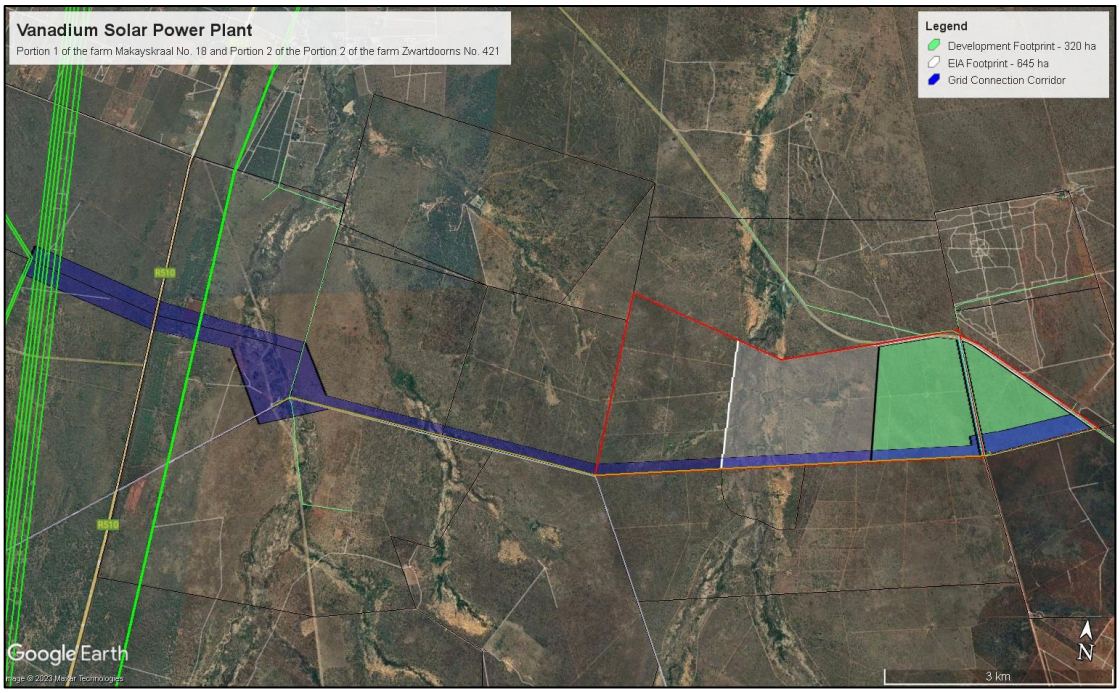


Figure 5.1: Location of the single preferred location alternative (i.e. development footprint) located within the affected property assessed

5.1.3 Activity alternatives

The scoping process also needs to consider if the development of a solar PV facility would be the most appropriate land use for the particular site.

- Photovoltaic (PV) solar facility – Vanadium Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. The Vanadium Solar Power Plant can be recycled.

- Wind energy facility - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines based on the renewable energy resource available for the area. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.

- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water, and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also the local area. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP as part of the energy mix of the county. Therefore, this alternative will not be considered further in this report.

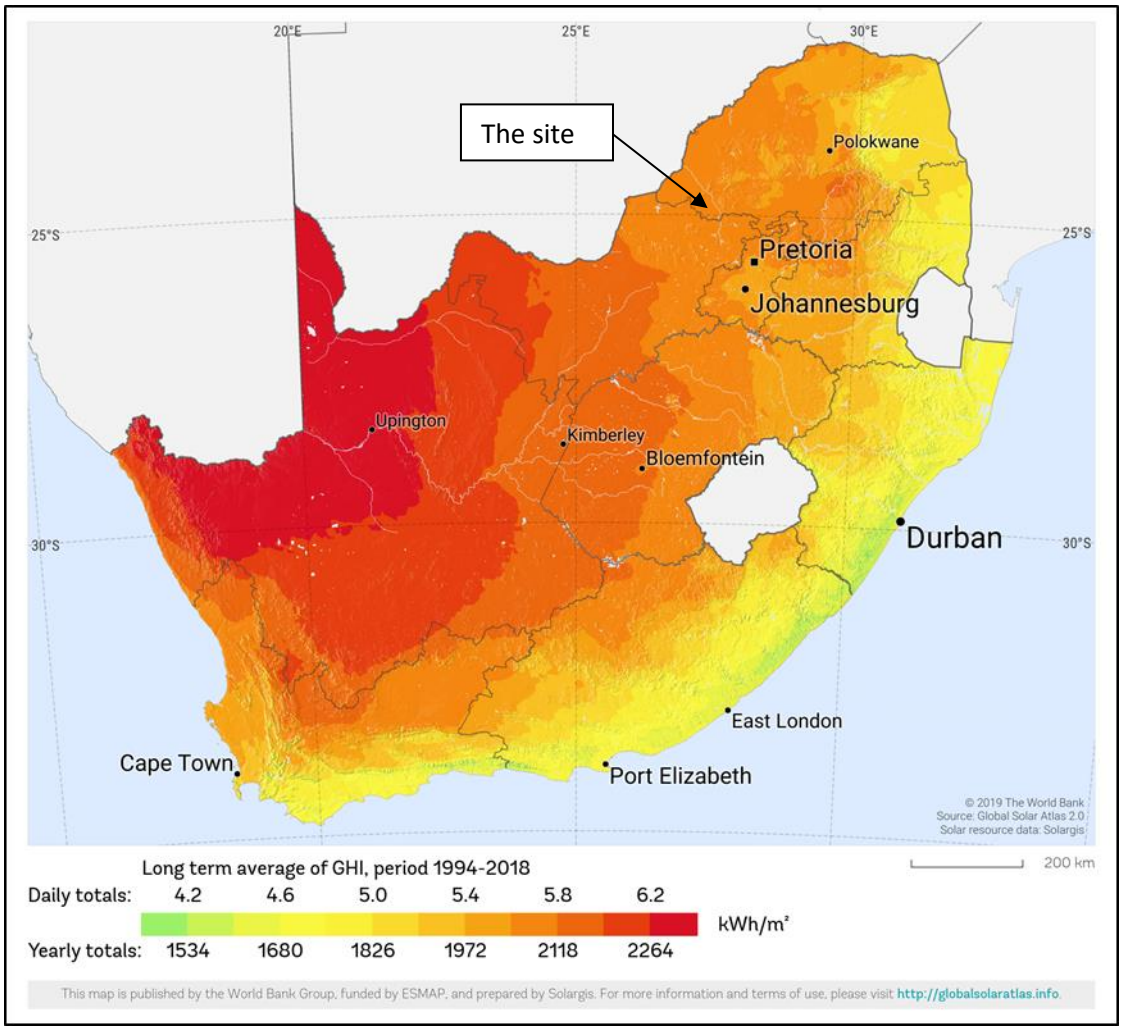


Figure 5.2: Global horizontal irradiation values for South Africa (Solar GIS, 2021) and the Vanadium Solar Power Plant development footprint.

5.1.4 Technical alternatives

Possible technical alternatives for the development of a solar PV facility needs to be considered during the EIA process.

5.1.4.1 Distribution lines

Generation from the facility will tie in with a newly proposed collector substation to be connected to the national grid via one of the existing Eskom 275kV or 400kV lines from Spitskop 400/275/88/kV MTS Substation. The connection power line will be constructed within the limits of the grid connection corridor. The grid connection route will be assessed within 15 km long and a 150m wide (up to 1 km wide in some instances) corridor. The Project will inject up to 150MW into the National Grid. The connection power line will be constructed within the limits of the grid connection corridor.

A 132kV overhead distribution line is the only preferred alternative for the applicant due to the following reasons:

- **Overhead Distribution Lines** - Overhead lines are less costly to construct than underground lines. Therefore, the preference for overhead lines is mainly based on cost.

Overhead lines allow high voltage operations, and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler *et al.*, 2006).

The overall weather conditions in the Limpopo Province are unlikely to cause damage and faults on the proposed overhead distribution power line. Nonetheless, if a fault occurs, it can be found quickly by visual means using a manual line patrol. Repair to overhead lines is relatively simple in most cases and the line can usually be put back into service within a few days. In terms of potential impacts associated with overhead distribution lines these include visual intrusion and threats to sensitive habitat (where applicable).

Furthermore, overhead power lines also provide an opportunity for the avoidance of sensitive environmental features as the overhead lines can span on-ground environmental features to ensure conservation, therefore providing more flexibility in terms of mitigation of the associated on-ground disturbance.

The choice of structure to be used for the power line will be determined in consultation with Eskom once the Engineers have assessed the geotechnical and topographical conditions and decided on a suitable structure which meets the prescribed technical requirements. The choice of structures to be used will not have any adverse impacts on the environment. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

The following alternatives may be considered for the overhead power line:

- Single Circuit Overhead Power Line

  The use of single circuit overhead power lines to distribute electricity is considered the most appropriate technology and has been designed over many years for the existing environmental conditions and terrain as specified in the Eskom Specifications and best international practice. Based on all current technologies available, single circuit overhead power lines are considered the most environmentally practicable technology available for the distribution of power. This option is considered appropriate for the following reasons:

  - More cost-effective installation costs;
  - Less environmental damage during installation; and
  - More effective and cheaper maintenance costs over the lifetime of the power line.

- Double Circuit Overhead Power Line

  Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the same tower structure) to minimise impacts. However, the use of double-circuiting has a number of technical disadvantages, which includes faults or problems on one power line may mean that the other power line is also disabled during maintenance, and this will affect the quality of supply to an area. Larger and taller towers as well as more towers are required for double-circuit power lines.

The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be offline as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.

- **Underground Distribution Lines** - Underground cables have generally been used where it is impossible to use overhead lines (for example due to space constraints). Underground cables are oil cooled and are also at risk of groundwater contamination. Maintenance is also difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines.

5.1.4.2 Battery Energy Storage Facility (BESS)

It is proposed that a nominal up to 500 MWh Battery Storage Facility for grid storage would be housed in stacked containers, or multi-storey building, with a maximum height of 8m and a maximum volume of 1,740 m3 of batteries and associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. The preferred battery technology is Lithium-ion.

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the base load and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer, which also included the consideration of sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. It should be noted that the final layout plan will be submitted as part of the EIA Report.

The Final layout follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, fencing and servitudes are considered. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, power lines, BESS and perimeter fences). With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.

The choice of pylon structure to be used for the power line will be determined in consultation with Eskom and does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, ecological and heritage impacts of erecting a power line. No defined structure has been confirmed at this stage and will depend on Eskom's technical requirements. The 132kV line must be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd. The structure to be utilised for the power line towers will also be informed by the local geotechnical and topographical conditions. The following alternatives are considered with regards to the proposed structures:

Steel lattice towers:

The steel lattice towers provide the following advantages over the other tower types available:

- Enables multipath earthing which enhances the overall electrical performance of the power line.
- Is visually less obtrusive than the mono-pole options.
- Is more practicable that other options i.e. more cost effective and more practical to construct and maintain.
- Is safer to work on than the monopole and wood pole structures.
- Is more durable than the wood pole structures.

Steel monopoles:

The steel monopole is considered less suitable than the steel lattice towers for the following reasons:

- Is visually more intrusive than the lattice towers.
- Is more expensive than the lattice towers.
- Requires more steel than the lattice towers.
- Is more difficult to erect.
- Is not as safe to work on as the lattice towers.

Wood poles:

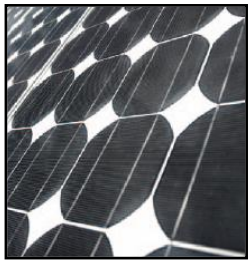
Wood pole structures are only used in extreme circumstances where a visual impact needs to be avoided. Wood pole structures may be cheaper to produce and to construct, but they have one tenth of the lifespan of the metal counterparts and are far more susceptible to weather conditions which makes them less efficient and practicable. The wood pole structure is also more susceptible to having the cross arms burnt off by electrical faults as well as being susceptible to deformation with height.

5.1.6 Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon and thin film. These technologies are discussed in more detail below:

- Crystalline (high efficiency technology at higher cost):

  Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



  - Mono-crystalline Silicon - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.

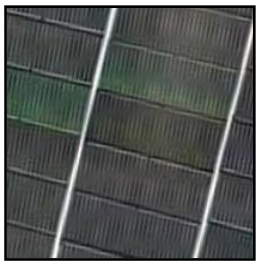
  - Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

- Thin film (low-cost technology with lower efficiency):

  Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:

- Cadmium Telluride (CdTe) - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.

- Amorphous Silicon - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- Copper, Indium, Gallium, Selenide (CIGS) - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications, and is considered a developing PV technology (First Solar, 2011).

- <u>Bifacial panels:</u>

  As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel. Refer to Figure 5.5.

  Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

  The technology that (at this stage) proves to be most feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of

technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

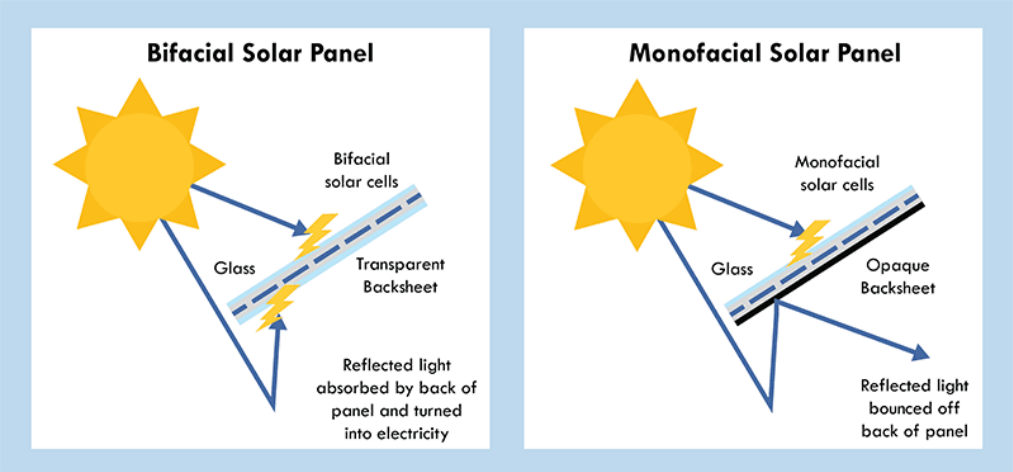


Figure 5.3: Bifacial vs Monoficial Solar Panel absorption.

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44.

5.2.1 General

The public participation process was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts;
- The sensitivity of the affected environment and the degree of controversy of the project; and
- The characteristics of the potentially affected parties.

Since the scale of anticipated impacts is low, the general land use of the area is related to mining and agriculture, the limited environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms are considered at this stage of the process. The following actions have already been taken (refer to Appendix C):

➢ Newspaper advertisement

Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Platinum Bushvelder) on the 14 October 2022 (see Appendix C2) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Environamics Environmental Consultants. I&APs were given the

opportunity to raise comments within 30 days of the advertisement (by 14 November 2022).

- Site notices

  Site notices were placed on site in Afrikaans and English on 28 September 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 28 October 2022. Photographic evidence of the site notices is included in Appendix C3.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, has been directly informed of the EIA process on 30 September 2022 via registered post, telephone calls, WhatsApps and emails (as relevant). The Background Information Document (BID) was distributed with the notification. For a complete list of I&APs with their contact details see Appendix C4 to this report. It was expected from I&APs to provide their inputs and comments by 31 October 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7).

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via registered post, WhatsApp or email (as relevant) to all surrounding landowners and occupiers on 12 October 2022. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C4. The surrounding landowners were given the opportunity to raise comments by 13 November 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7). Refer to Figure 5.6.

- Circulation of Final Scoping Report

  Copies of the Final Scoping report has been provided to all I&APs via courier, Dropbox and/or email (as relevant). Hard copies of the report will be made available on request and where an I&AP does not have the resources to view the report on an online platform. I&AP's and organs of state were requested to provide their comments on the report from 08 May 2023 until 07 June 2023. All issues identified during the 30-day review and comment period will be recorded and documented and compiled into a Comments and Response Report to be included as part of the Final Scoping Report for decision-making.

5.2.2 Consultation process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C4 and C5.

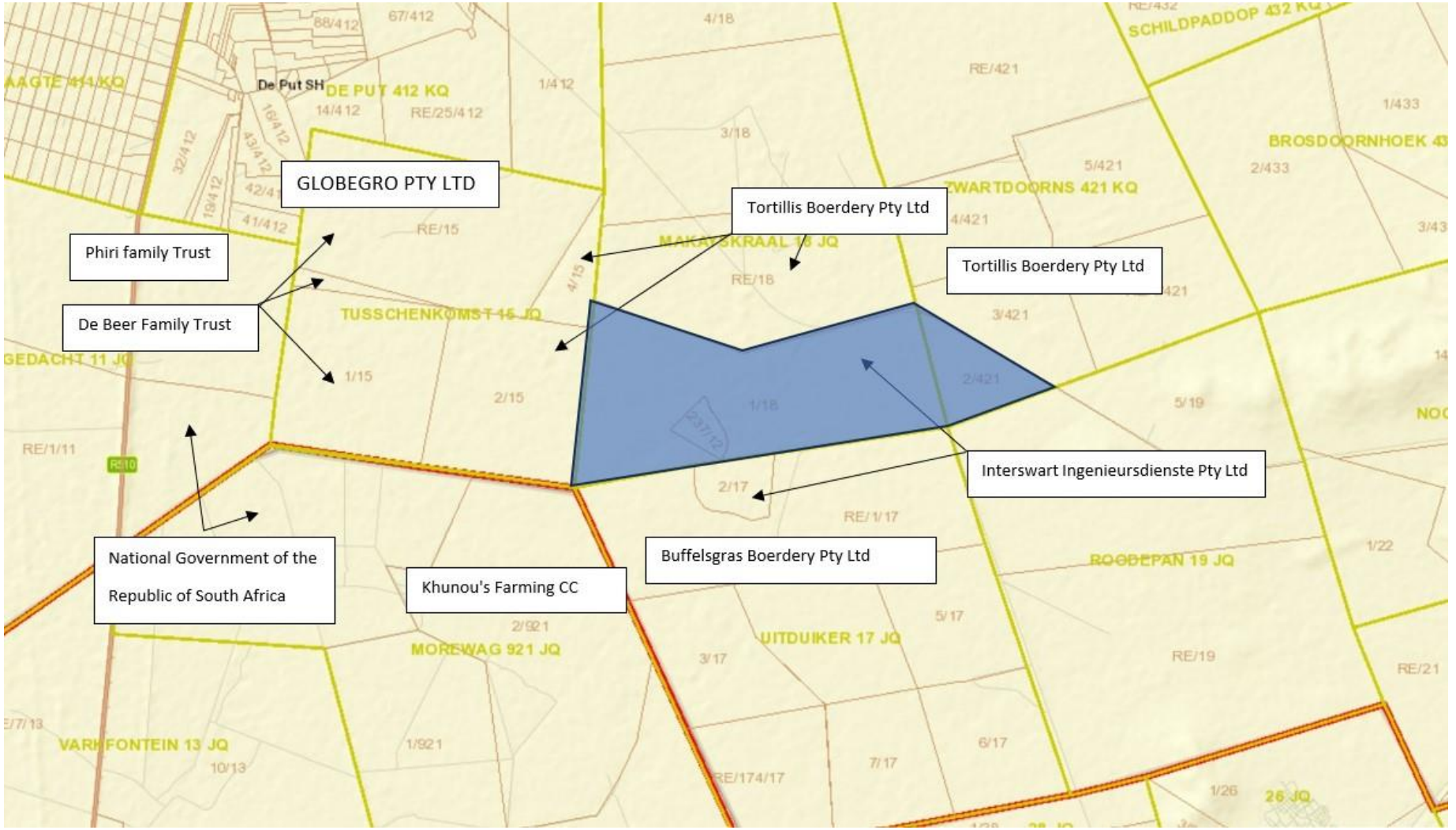


Figure 5.4: Surrounding landowners.

5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) "*A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application*."

This report is the Final Scoping Report which has been made available to all potential and/or registered I&APs and State Departments. They have been provided with a copy of the Final Scoping Report and have been requested to provide written comments on the report within 30 days. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the Final Scoping report.

All comments received prior to the release of the Final Scoping Report for the 30-day review and comment period have been included in this report as Appendix C5 ,Appendix C6 and Appendix C7 to provide I&APs an opportunity to confirm that their comments raised during the initial public participation phase has been included and considered as part of the EIA process.

5.2.4 Issues raised by I&APs and consultation bodies

To date the interim comment from SAHRA has been received and is summarised in the Comments and Response Report included in Appendix C7.

Any comments received during the circulation of the Final Scoping Report will be summarised in the final Scoping Report. The full wording and original correspondence are included in Appendix C6.

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred alternative (i.e. the location of the development footprint within the affected property).

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to the Table 1.2.

However, due to the fact that the area proposed for development (i.e. the development footprint) exclusively consists of land used for grazing, limited sensitive areas from an ecological, heritage or conservation point have been identified. These include the two wetland features consisting of a hillslope seep wetland and a valleybottom wetland. These features are described in more detail below.

5.3.1.1 Soils and agricultural potential

According to the Soil and Agriculture Assessment (attached in Appendix E4), the project site is characterised by the Ae 62, Ae 64, and Fa 4 land types. The Ae 62 and Ae 64 land types mainly have Mispah, Hutton and Shortlands soil forms according to the Soil classification working group, (1991), with the occurrence of other soils within the landscape. The Fa 4 land type is characterised with occurrence of Mispah, Glenrosa, Dundee, Inhoek, Oakleaf and Wasbank soil forms associated to other soils in the terrain. The Ae land types are characterised by freely drained deep (> 300mm) red-yellow apedal soils with high base status. The Fa land types are characterised by Glenrosa and/ or mispah soils with the absence of lime. Most of the project area is characterised by a slope percentage between 0 and 4%, with some smaller patches within the project area characterised by a slope percentage ranging from 4 to 7%. This illustration indicates a few irregularities in the topography in scattered areas the majority of the area being characterised by a gentle slope. The DEM of the project area indicates an elevation of 1 006 to 1 101 Metres Above Sea Level (MASL).

The land capability is determined by the physical features of the landscape including the soils present. The land potential or agricultural potential is determined by combining the land capability results and the climate capability for the region. The climatic capability has been determined by means of the Smith (2006) methodology, of which the first step includes determining the climate capability of the region by means of the Mean Annual Precipitation (MAP) and annual Class A pan (potential evaporation). According to Smith (2006), the climatic capability of a region is only refined past the first step if the climatic capability is determined to be between climatic capability 1 and 6.

Given the fact that the climatic capability has been determined to be “C8” for the project area, no further steps will be taken to refine the climate capability. From the two land capability classes, the land potential levels have been determined by means of the Guy and Smith (1998) methodology. The land capability was determined by using the guidelines described in “The farming handbook” (Smith, 2006). The delineated soil forms were clipped into the four different slope classes (0-2%, 2-4%, 4-6% and 6-7%) to determine the land capability of each soil form. Accordingly, the most sensitive soil forms associated with the project area are restricted to land capability IV and VI classes as indicated by Table 5.1 below.

Table 5.1: Land Capability of the soils for the project site

Land Capability Class	Definition of Class	Conservation Need	Use-Suitability	Land Capability Group	Sensitivity
IV	Severe limitations. Low arable potential. High erosion hazard.	Intense conservation practice and tillage methods.	Long-term leys (75%)	Arable	Moderate
VI	Limitations preclude cultivation. Suitable for perennial vegetation.	Protection measures for establishment, e.g., sod-seeding.	Veld, pasture, and afforestation.	Non-arable	Low

The following land potential level has been determined;

- Land potential level 6: This land potential level is characterised by very restricted potential - Regular and/or severe limitations due to soil, slope, temperatures, or rainfall. Non-arable
- Land potential level 7: This land potential level is characterised by a Low potential. Severe limitations due to soil, slope, temperatures, or rainfall. Non-arable.

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which four potential land capability classes are located within the proposed footprint area's assessment corridor, including;

- Land Capability 6 to 8 (Low to Moderate Sensitivity);
- Land Capability 9 to 10 (Moderate to High Sensitivity); and
- Land Capability 11 to 15 (High to Very high Sensitivity).

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area. The PV area is predominately covered by "Low to moderate" sensitivities. On the other hand, the powerline is predominately characterised by sensitivities with "High" and "Very High", with small patches of "Low to Moderate" sensitivities (Figure 5.5). Furthermore, a crop field was identified by means of the DEFF Screening Tool (2023), which is characterised by "High" sensitivities. The Land Capability Sensitivity indicates the "crop field" are within low to moderate capability sensitivity areas. It is the specialist`s recommendation that development can occur on the crop field area. The specialist assessment disputes the High sensitivity ratings for the project site, since the field survey determined that the sensitivity for the site ranged from low to moderate.

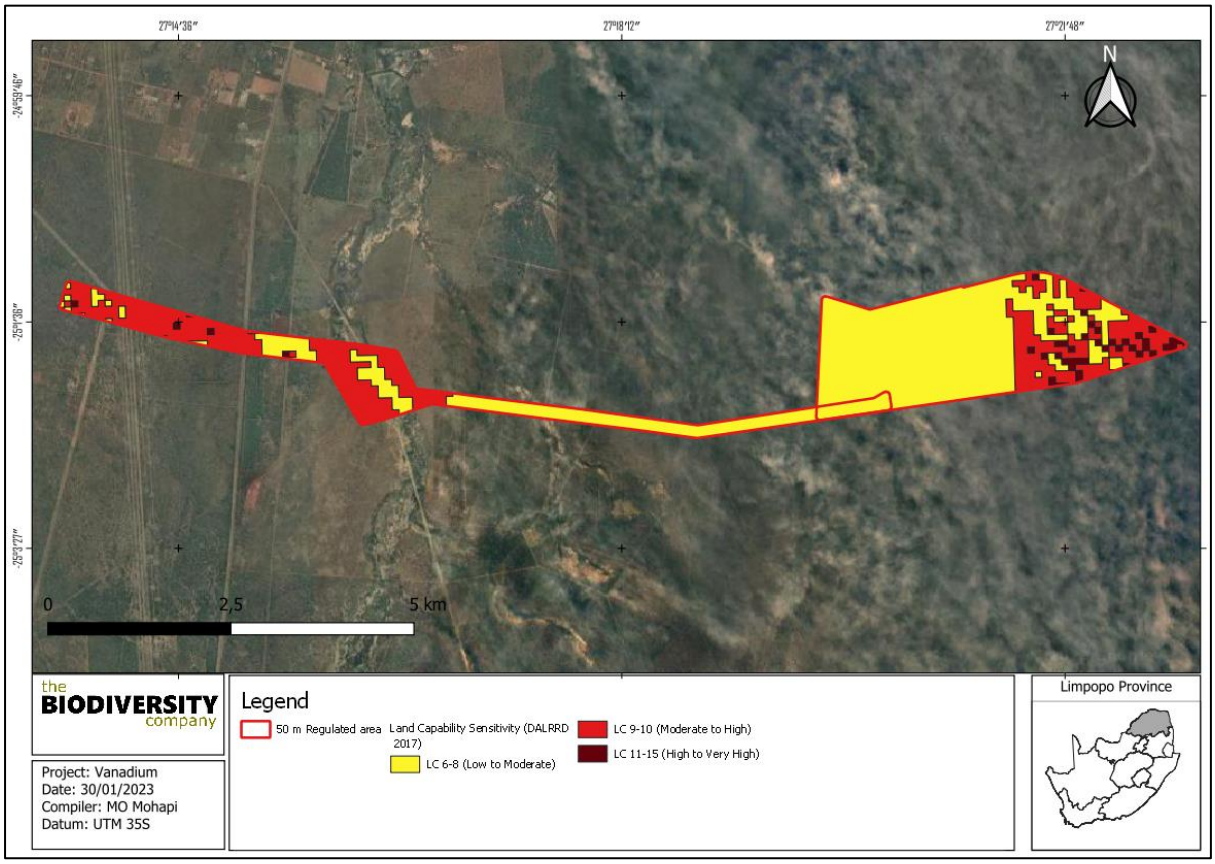


Figure 5.5: The land capability sensitivity

5.3.1.2 Vegetation and landscape features

According to the Terrestrial Biodiversity Impact Assessment (Appendix E1), the table below (Table 5.2) has been produced as a result of the spatial data collected and analysed (as provided by various sources such as the national and provincial environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or project area. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 5.2: Summary of the spatial relevance of the Project Area to local ecologically important landscape features

Desktop Information Considered	Description
Provincial Conservation Plan	The proposed project is situated across an CBA1, ESA1 and Other Natural Areas (ONAs).
Ecosystem Threat Status	Overlaps with a 'Least Concern' ecosystem.
Ecosystem Protection Level	Overlaps with a 'Poorly Protected', 'Moderately Protected' and 'Well Protected' ecosystem.
Protected Areas	The PAOI overlaps with the Sporting Chance Private Nature Reserve, Hou Moed Private Nature Reserve and borders the Philip Wulfsohn Private Nature Reserve.
National Protected Areas Expansion Strategy	The PAOI overlaps with a 'Protected Area' according to the NPAES database.
Important Bird and Biodiversity Areas	The PAOI is located 7 km from the Northern Turf Thornveld IBA.
REDZ	The PAOI does not overlap with a Renewable Energy Development Zone.
Powerline Corridor	The PAOI does not overlap with any powerline corridors.
South African Inventory of Inland Aquatic Ecosystems	The PAOI overlaps with a CR river and borders CR and LC wetlands.
National Freshwater Priority Area	The PAOI overlaps with an unclassified NFEPA River and several unclassified NFEPA wetlands.

Critical Biodiversity Areas

According to the Limpopo Conservation Plan the proposed project is situated across a Critical Biodiversity Area 1 (CBA 1), Ecological Support Area 1 (ESA 1) and Other Natural Areas (ONAs). Refer to Figure 5.6 below.

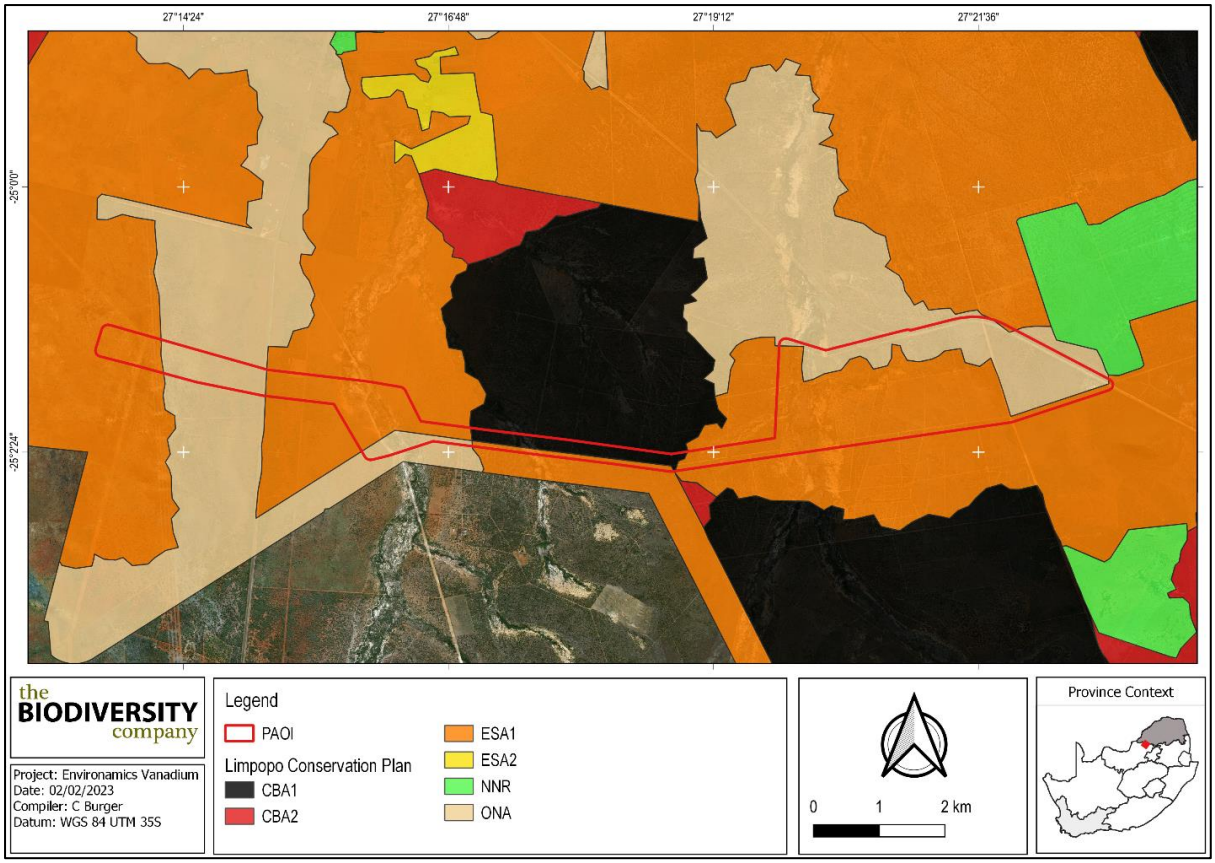


Figure 5.6: Map illustrating the Limpopo Conservation Plan relevance

Ecosystem Threat Status

According to the 2018 NBA spatial dataset the PAOI overlaps with a 'Least Concern' and 'Poorly Protected', 'Moderately Protected' and 'Well Protected' ecosystem (Figure 5.7).

A 'Least Concern' ecosystem type is one which has experienced little or no loss of natural habitat or deterioration in condition, and 'Poorly Protected' ecosystems are those which have between five and 50% of their biodiversity target included in one or more protected areas (SANBI, 2019). A 'Moderately Protected' ecosystem type is one that has between 50 and 100% of its biodiversity target included in one or more protected areas (SANBI, 2019).

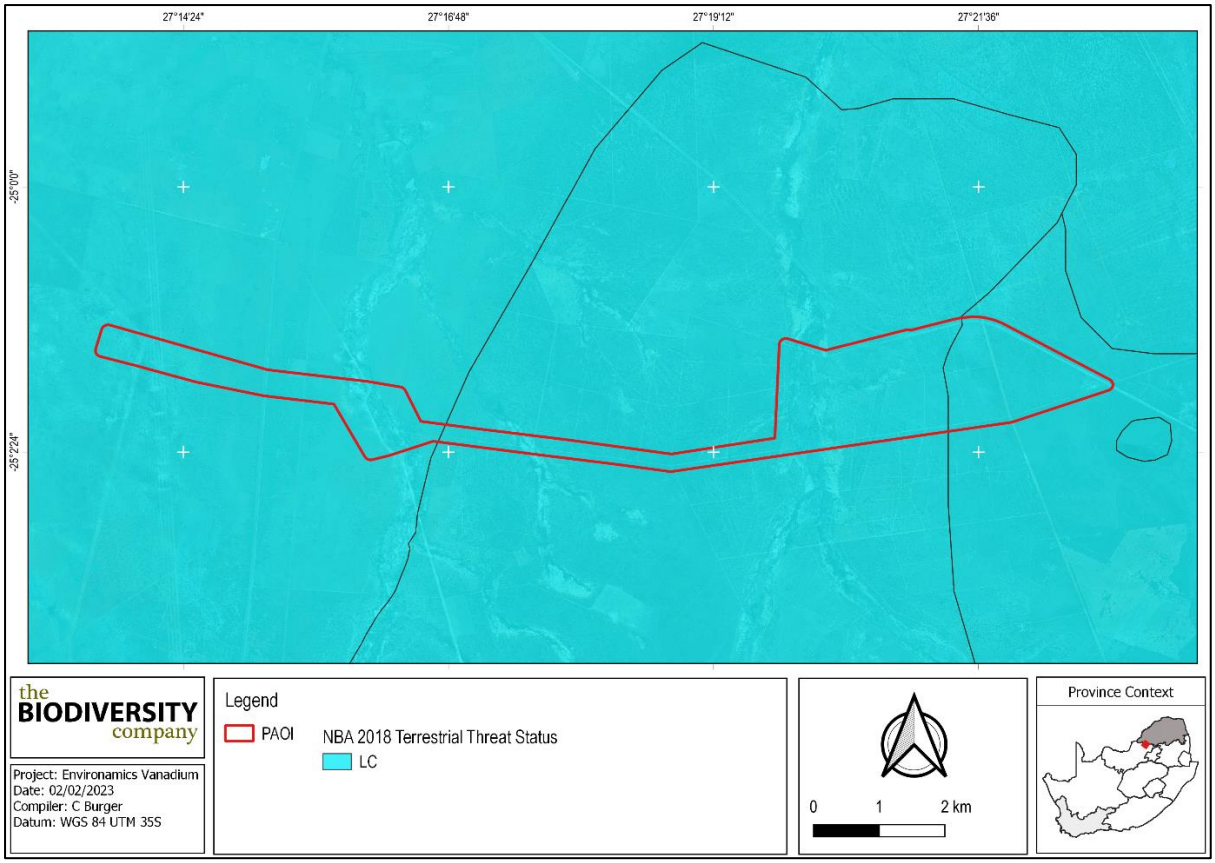


Figure 5.7: Map illustrating the Ecosystem Threat Status associated with the project area

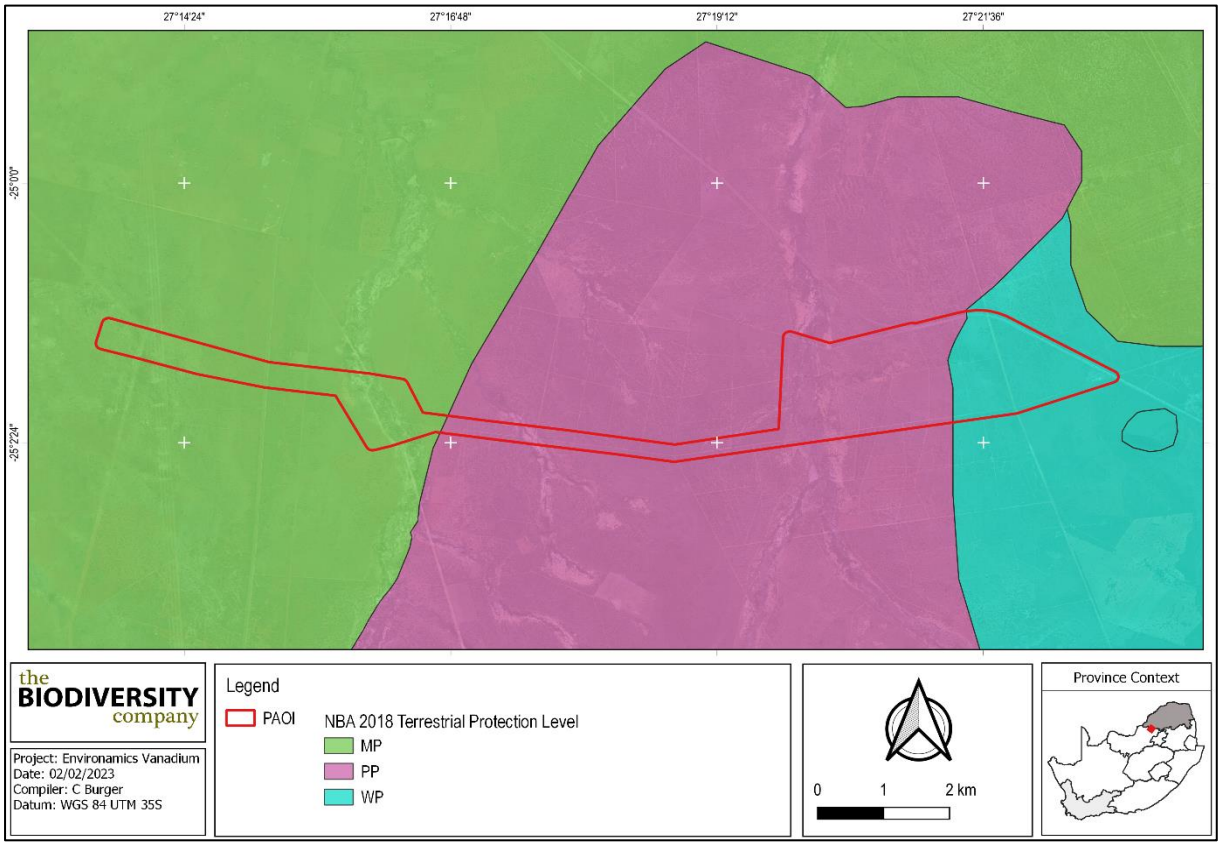


Figure 5.8: Map illustrating the Ecosystem Protection Level associated with the PAOI

Protected Areas

According to the protected area spatial datasets from SAPAD (2021) and SACAD (2021), the PAOI overlaps with the Sporting Chance Private Nature Reserve, Hou Moed Private Nature Reserve and borders the Philip Wulfsohn Private Nature Reserve (Figure 5.9).

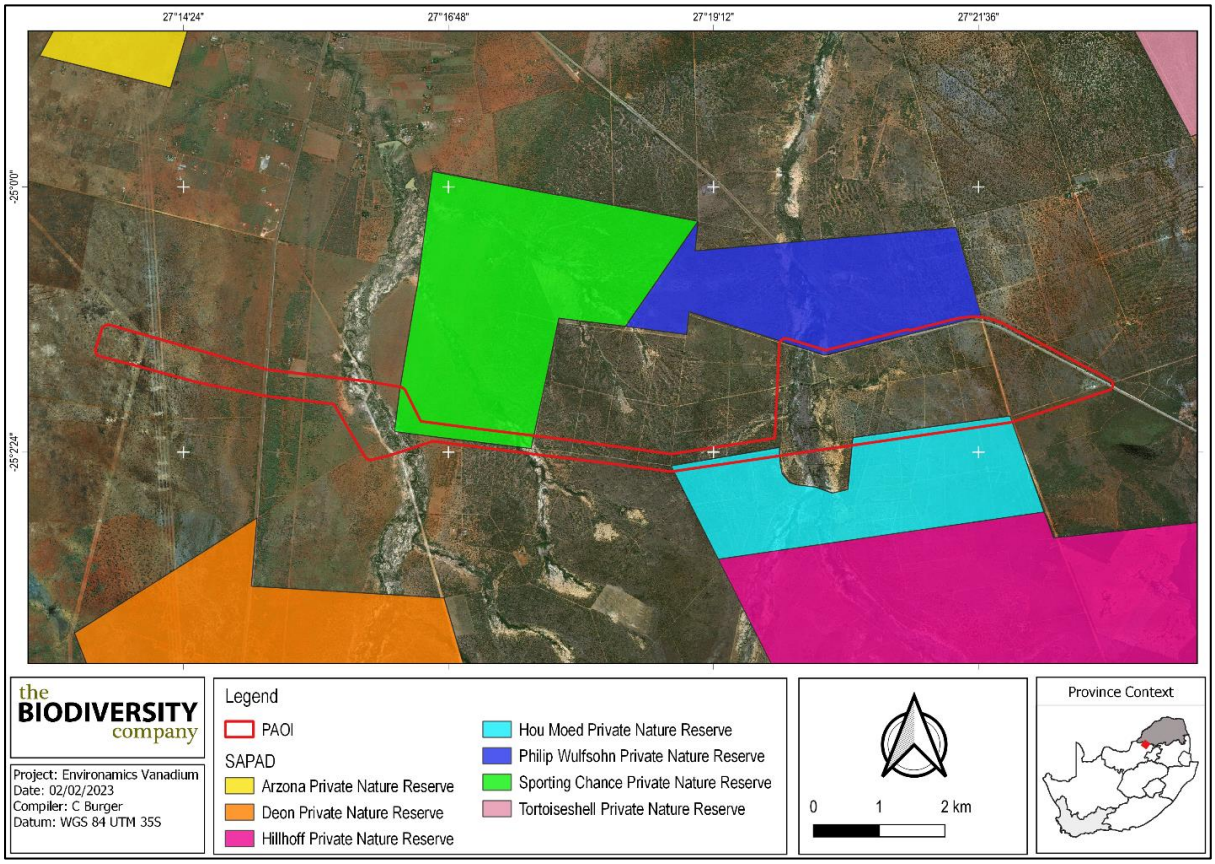


Figure 5.9 : Map illustrating the project area in relation to the protected areas

National Protected Areas Expansions Strategy (NPAES)

National Protected Area Expansion Strategy 2016 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The PAOI overlaps with a 'Protected Area' according to the NPAES database (Figure 5.10).

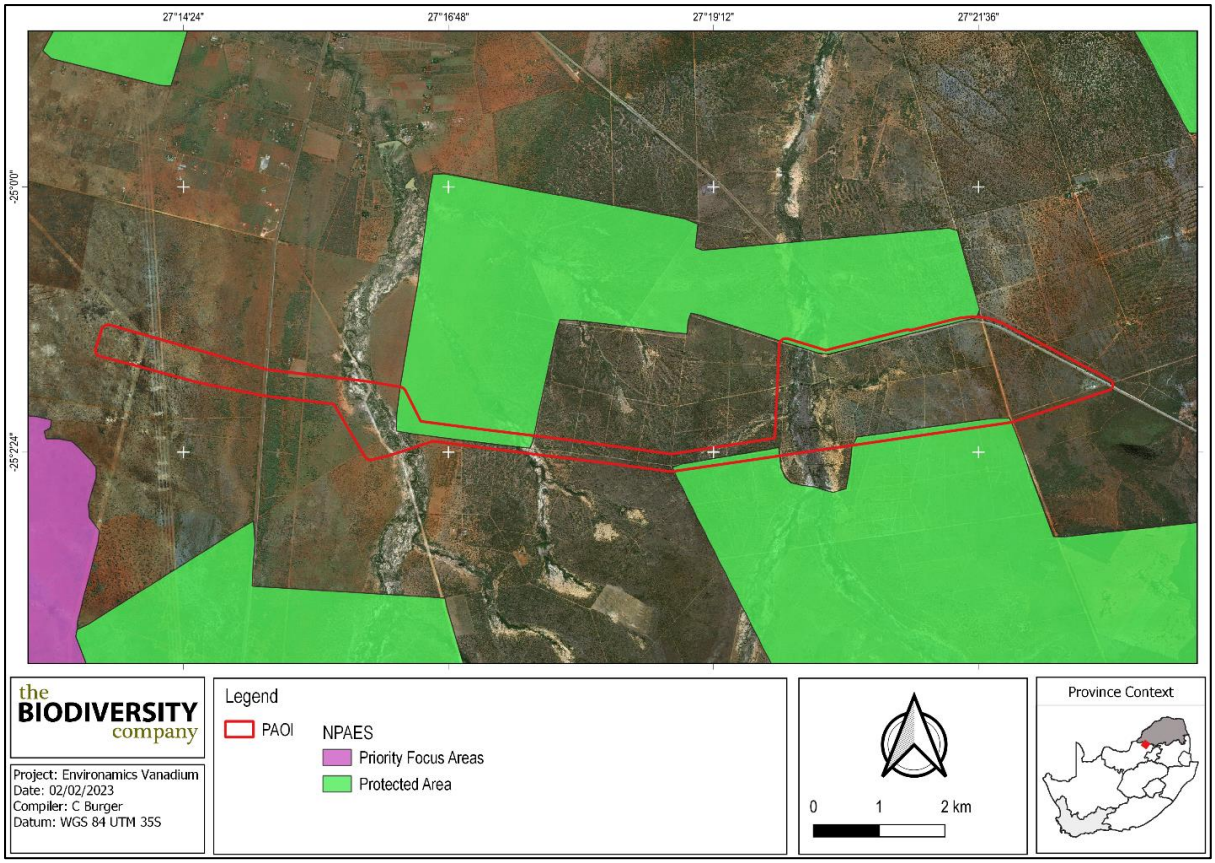


Figure 5.10 : The project area in relation to the National Protected Area Expansion Strategy

Vegetation Type

The project area is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

a) Seasonal precipitation; and

b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by an herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include Vachellia and Albizia) and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the PAOI overlaps with the Dwaalboom Thornveld, Central Sandy Bushveld and the Western Sandy Bushveld vegetation type (Figure 5.11). Dwaalboom Thornveld is restricted to and is distributed in Limpopo and North-West Provinces, within flats north of the Dwarsberge and associated ridges mainly west of the Crocodile River in the Dwaalboom area but

including a patch around Sentrum. South of the ridges it extends eastwards from the Nietverdiend area, north of the Pilanesberg to the Northam area at an altitude range of between 900 and 1,200m AMSL. Its main vegetation and landscape features include plains with a layer of scattered, low to medium high, deciduous microphyllous trees and shrubs with a few broad-leaved tree species. There is almost a continuous herbaceous layer dominated by grass species. According to Mucina and Rutherford (2006) Dwaalboom Thornveld is classified as Least Threatened. Although the target for conservation is 19%, only 6%of this vegetation type is currently under statutory conservation in reserves such as the Madikwe Game Reserve. Cultivation and to a lesser extend urbanisation have resulted in the transformation of approximately 14% of Dwaalboom Thornveld and exotic invasive plants are present. Incidences of erosion are low to very low (Mucina & Rutherford, 2006).

The Central Sandy Bushveld is characterised by low undulating areas, sometimes between mountains, and sandy plains and catenas supporting tall, deciduous *Terminalia sericea* and *Burkea africana* woodland on deep sandy soils (with the former often dominant on the lower slopes of sandy catenas) and low, broad-leaved *Combretum* woodland on shallow rocky or gravelly soils (Mucina & Rutherford, 2006). This vegetation is classified as Vulnerable, with a conservation target of 19% (Mucina & Rutherford, 2006). Less than 3% statutorily conserved spread thinly across many nature reserves including the Doorndraai Dam and Skuinsdraai Nature Reserves (Mucina & Rutherford, 2006).

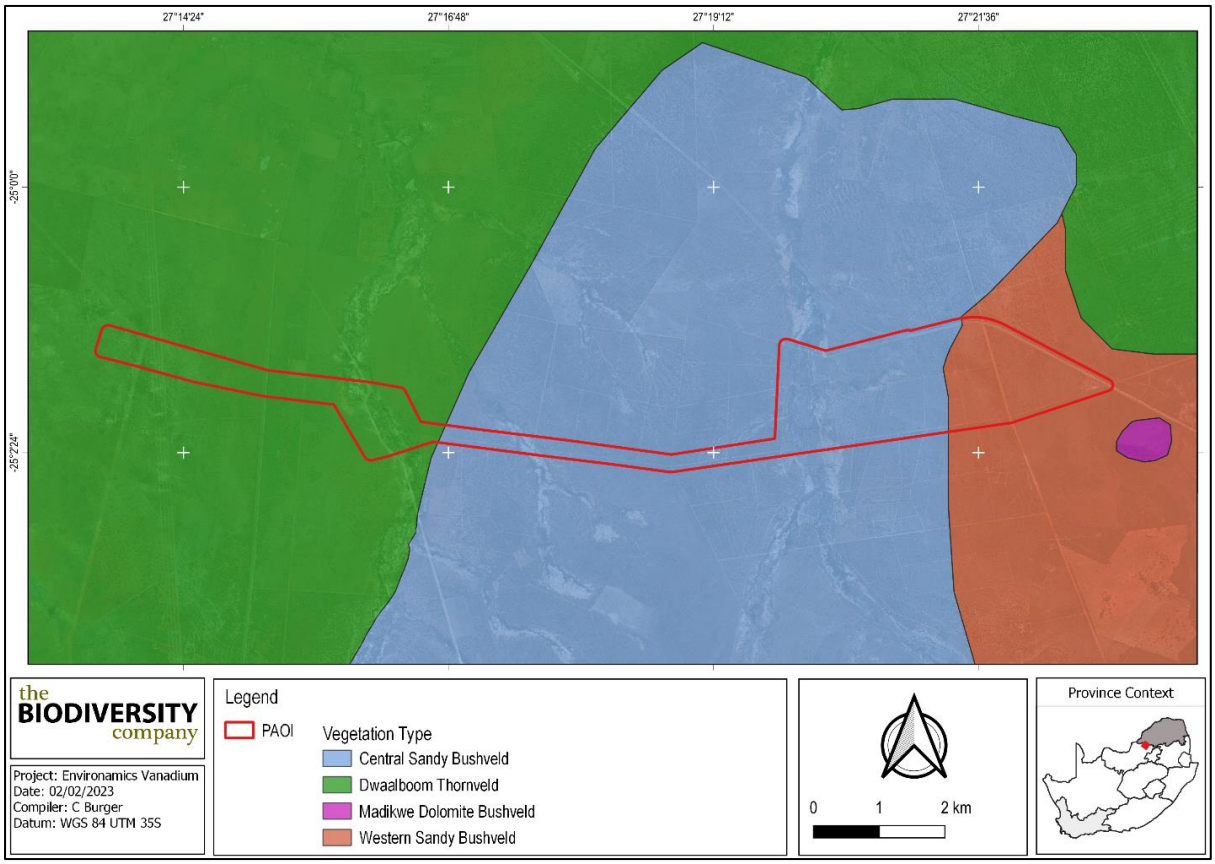


Figure 5.11: Map illustrating the vegetation types associated with the region

Indigenous and Protected Flora

The vegetation assessment was conducted throughout the extent of the PAOI. Various indigenous species associated with the Dwaalboom Thornveld, Central Sandy Bushveld and the Western Sandy Bushveld vegetation type were observed across the PAOI. Refer to Figure 5.12 for photographs illustrating some of the plant species found within the PAOI. The dominant medium to large trees

observed included *Senegalia caffra, Senegalia mellifera, Sclerocarya birrea subsp. caffra, Combretum imberbe and Ziziphus mucronata,* while the dominant shrub species comprise predominantly of *Grewia flava, Grewia flavescens, Diospyros lycioides subsp. lycioides, and Dichrostachys cinerea. Dominant graminoids included Digitaria eriantha, Panicum maximum, Hyparrhenia hirta,* and *Cymbopogon caesius.*

During the field assessment 3 species of protected trees were observed: *Boscia albitrunca* (Shepard's tree), *Sclerocarya birrea subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood). The protected trees observed are protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA). In terms of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence. The information only provides an overview of the protected trees recorded on site and is not a representation of all the specimens present. It is of vital importance that a search a rescue along with permit applications be done prior to the commencement of the development.

Limpopo Environmental Management Act (LEMA) (Act no 7 of 2003)

The LEMA provides for the consolidation and amendment of the environmental management legislation of, or assigned to the Province, and to provide for matters incidental thereto. In particular, Schedule 11 (Specially protected plants) and Schedule 12 (Protected plants) have relevance to this section. The species *Spirostachys africana* were found within the PAOI and is considered to be protected plants under Schedule 12 of LEMA.

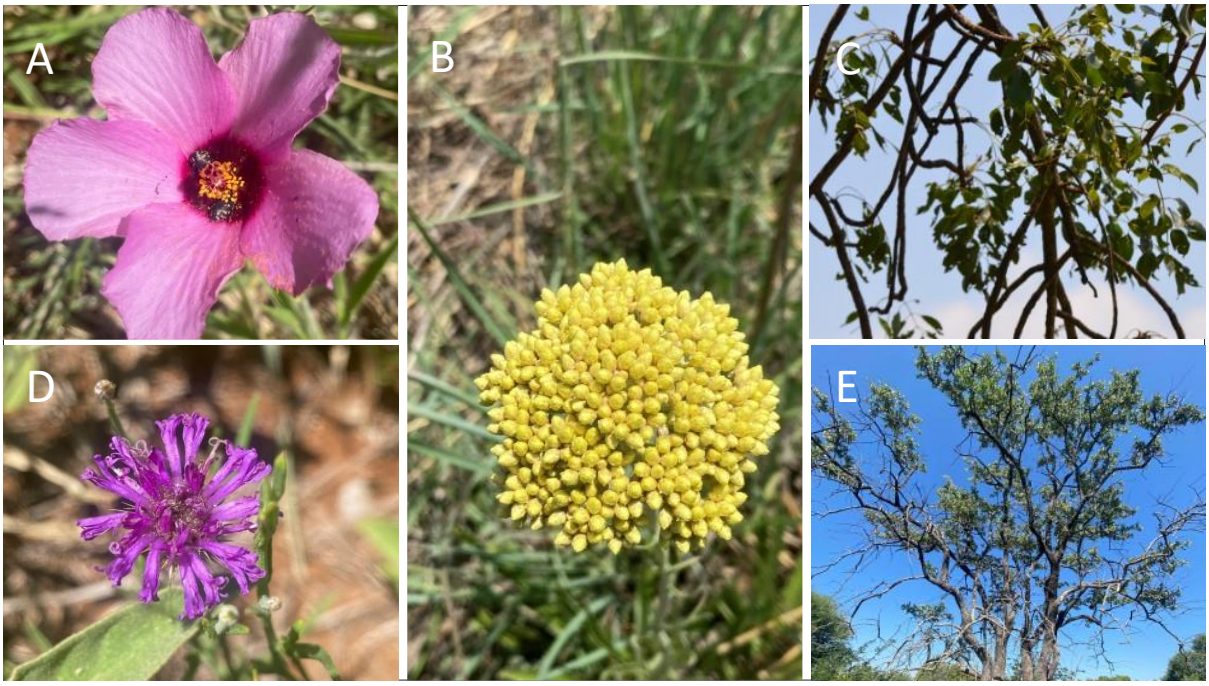


Figure 5.12: Photographs illustrating some of the flora species recorded – A) *Hibiscus microcarpus*; B) *Helichrysum nudifolium*; C) *Sclerocarya birrea* (Protected); D) *Chlorophytum saundersiae* and E) *Combretum imberbe* (Protected)

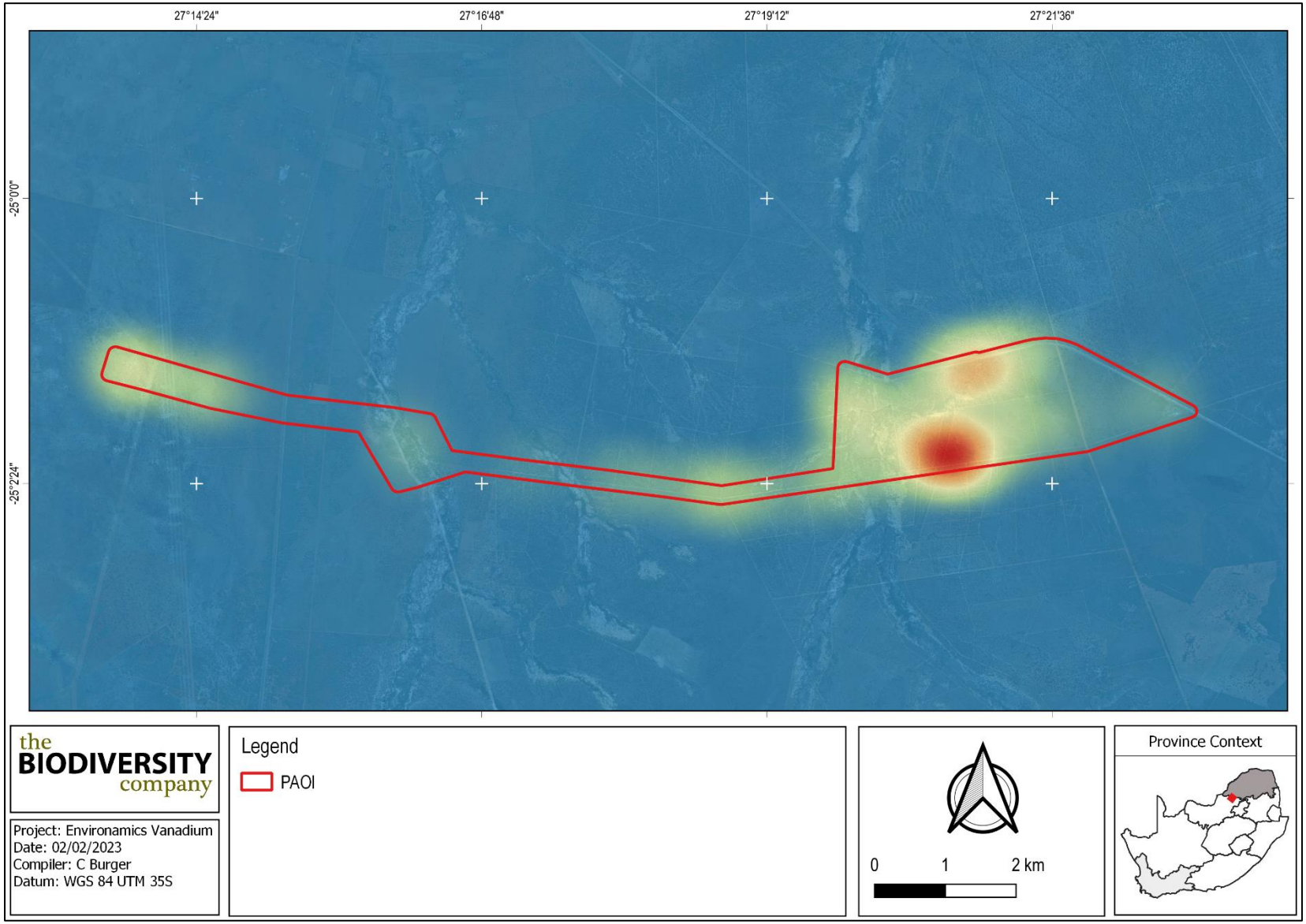


Figure 5.13: Heatmap indicating presence and density of protected trees, from Red to Blue. Red=High number, Blue=None

Invasive Alien Plants

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004, (NEM:BA) is the national legislation that incorporates the mandatory regulation of Invasive Alien Plant (IAP) species, and in September 2020 the most current lists of IAP Species were published in terms of NEM:BA (in Government Gazette No. 43726 of 18 September 2020). The Alien and Invasive Species Regulations serve to define and regulate the various categories of Alien and Invasive Species and were recently updated and published in terms of NEM:BA in the Government Gazette No. 43735 of 25 September 2020. The 2020 Alien and Invasive Species Regulations and Lists were recently extended as published in the Government Gazette No. 44182, 24th of February 2021.

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEM:BA:

- Category 1a: Invasive species requiring compulsory eradication. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones. Species existing outside of a regulated area shall be classified as category 1b.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as a gift - involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones as these will be classified as category 1b species.

Eight (8) IAP species were recorded during the field survey, of which four (4) are Category 1b species which must be controlled through the implementation of an IAP Management Programme (table 5.4 below).

Table 5.3: Alien and Invasive Plant species recorded in the project area

Family	Scientific Name	NEMBA Category
Papaveraceae	*Argemone ochroleuca*	NEMBA Category 1B
Asteraceae	*Cirsium vulgare*	NEMBA Category 1B
Meliaceae	*Melia azedarach*	NEMBA Category 1B
Verbenaceae	*Verbena bonariensis*	NEMBA Category 1B

Habitat Assessment:

The main habitat types identified across the PAOI were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 5 14. Emphasis was placed on limiting timed meander searches along the proposed PAOI within the natural habitats and therefore habitats with a higher potential of hosting SCC.

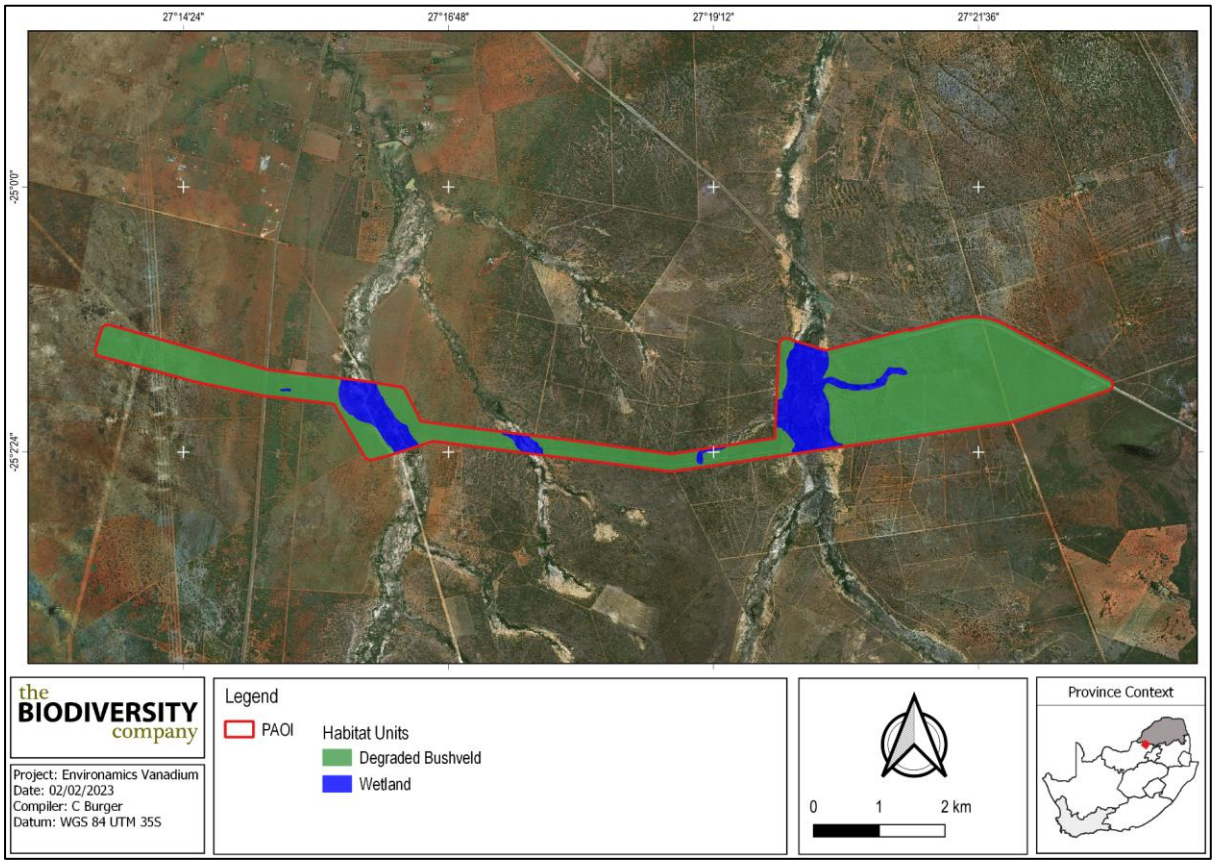


Figure 5.14: Map illustrating the habitats identified in the project area

Degraded Bushveld Habitat

The majority of the PAOI comprised of degraded bushveld habitat, which is typically characterised by stands of large trees of the species Senegalia, Combretum and Ziziphus clustered together accompanied by tall shrubs and grass species. This habitat type is regarded as semi-natural bushveld, but slightly disturbed due to the presence of roads, powerlines, and human infringement as the area is utilised for grazing by both wild game and cattle.

The dominant vegetation across the habitat unit included medium to large trees such as *Senegalia caffra, Senegalia mellifera, Sclerocarya birrea subsp. caffra, Combretum imberbe,* and *Ziziphus mucronata,* while the dominant shrub species comprise predominantly of *Grewia flava, Grewia flavescens, Diospyros lycioides subsp. Lycioides, and Dichrostachys cinerea. Dominant graminoids included Digiteria eriantha, Panicum maximum, Hyparrhenia hirta, and Cymbopogon caesius*. Within the habitat unit there is a difference in the condition pertaining to some areas being exposed to more disturbance from grazing practises and other anthropogenic related activities than others.

During the field assessment 3 species of protected trees were observed: *Boscia albitrunca* (Shepard's tree), *Sclerocarya birrea subsp. caffra* (Marula) and *Combretum imberbe* (Leadwood). The protected

trees observed are protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA). Additionally, *Spirostachys africana* were found and is listed as protected under Schedule 12 of the Limpopo Environmental Management Act (LEMA) (Act no 7 of 2003).

This habitat unit can be regarded as important, not only within the local landscape, but also regionally. The unit functions as remaining greenlands which supports viable indigenous plant species populations and is also used for foraging. The unit also serves as a movement corridor for fauna within a landscape mainly fragmented by agricultural practices. This was especially evident with the recording of *Panthera pardus* (Leopard), listed as VU regionally and internationally, moving within the habitat unit.

Figure 5.15: A representative photograph of the Degraded Bushveld Habitat

Wetlands

Wetlands are identified in the wetland report (TBC, 2023). The ecological integrity, importance and functioning of the wetland areas associated with the PAOI plays a crucial role as a water resource system and an important habitat for various fauna and flora.

Figure 5.16: Illustration of wetland habitat from the project area

Site Ecological Importance

The two delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 5.4 below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the PAOI are mapped in Figure 5.17 below.

Table 5.4: Sensitivity summary of the habitat types delineated within the PAOI of Influence

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Degraded Bushveld	Medium - > Confirmed or highly likely occurrence of populations of VU species	High - Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.	**Medium**	Low	**High**
Wetland	Medium - > 50% of receptor contains natural habitat with potential to support SCC	Medium - Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance.	**Medium**	Medium	**Medium**

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities (noted in conjunction with provincial guidelines pertaining to CBA and ESA areas):

- Medium: Minimisation and restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities.
- High: Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

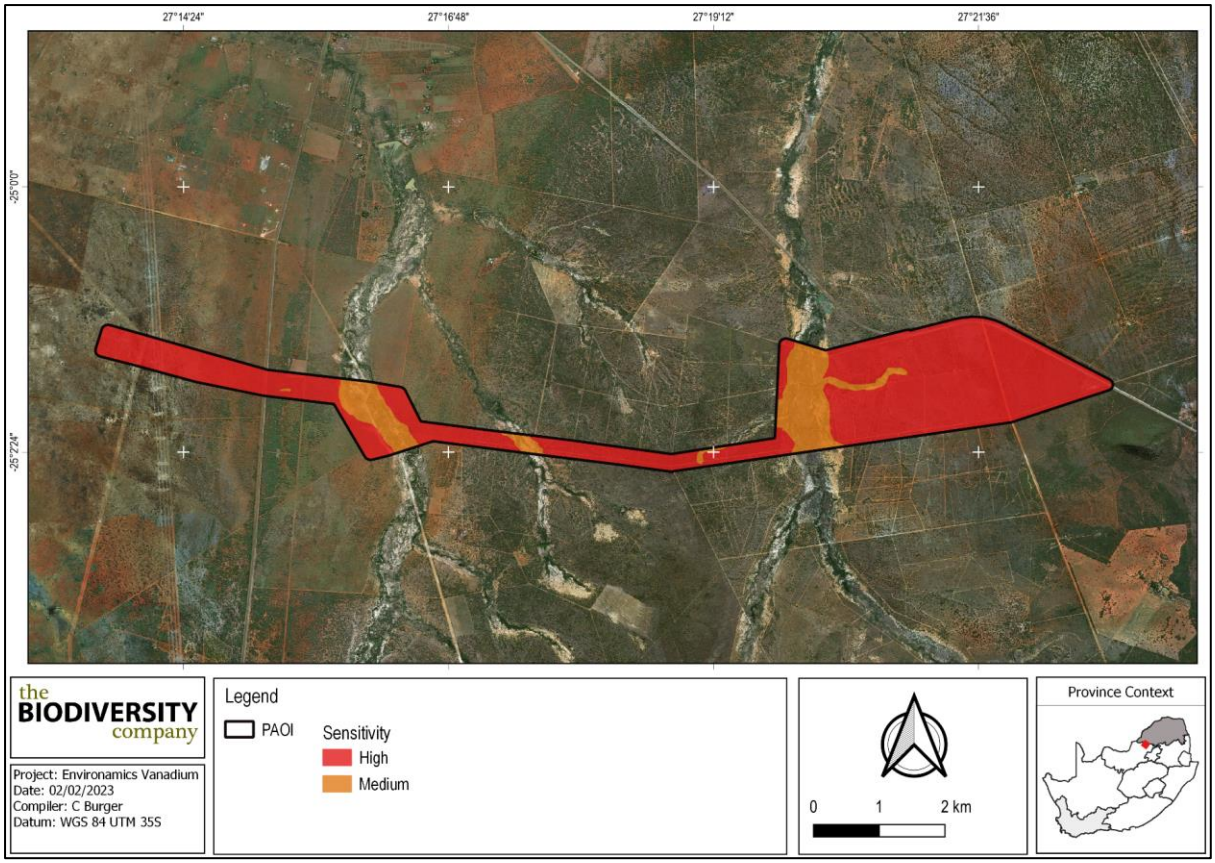


Figure 5.17: Map illustrating the sensitivities of the habitats delineated within the overall PAOI

Screening Tool Comparison

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the PAOI overlapping with a CBA1, ESA1, Sporting Chance Private Nature Reserve and the Hou Moed Private Nature Reserve, while the animal species theme is classified as medium and the plant species theme is classified as low sensitivity. The completion of the Terrestrial Baseline and Impact Assessment confirmed the high sensitivity of the degraded bushveld habitats that overlap with the screening report.

The screening report classified the animal species them as “Medium” sensitivity and plant species theme sensitivity as being of a “Low” sensitivity. Following the findings of the field survey, the animal species theme (from a mammal and herpetofauna perspective) should be assigned a “high” sensitivity, based on the confirmed presence of the VU Panthera pardus (Leopard), and the plant species theme should be assigned a “Medium” sensitivity due to the presence of protected species.

5.3.1.3 Wetlands and Riparian Features

According to the Wetland Impact Assessment Report (Appendix E9), South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released as part of the National Biodiversity Assessment (NBA 2018). National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE, 2018).

Three wetland type was identified by means of this data set. The wetlands are classified as being two depressions, a floodplain and a hillslope seep wetland. The hillslope seep and depression wetlands were classified as being a C (Moderately Modified) with the floodplain being a A/B (largely Natural)

(see Figure 5.18). Three National Freshwater Ecosystem Priority Areas (NFEPA) wetland types have been identified within the project area of influence, namely one channelled valley bottom wetlands, one unchannelled valley bottom and multiple hillslope seep wetlands.

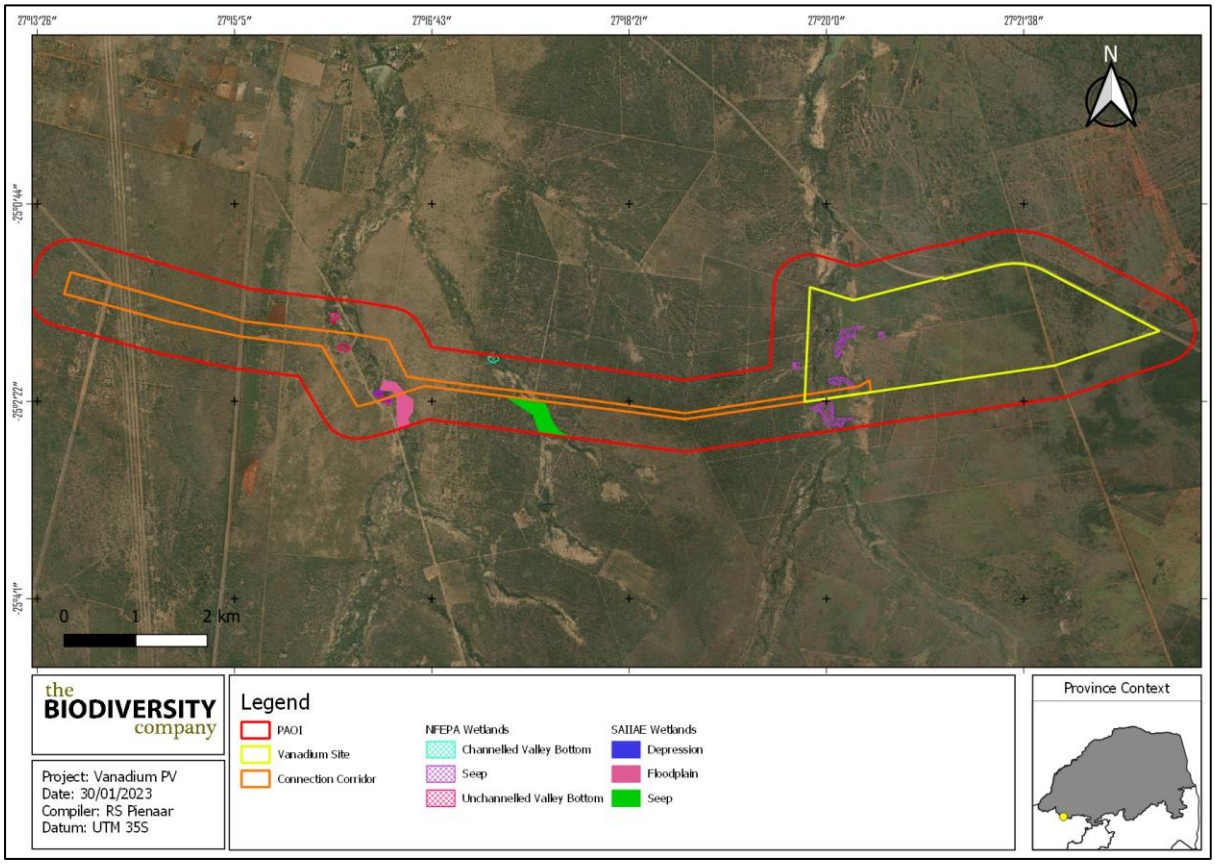


Figure 5.18: SAIIAE and NFEPA wetlands located within PAOI

Delineation and Description

The Wetland Impact Assessment (Appendix E9) indicates that six hydrogeomorphic (HGM) units were identified within the PAOI. The wetland areas were delineated in accordance with the DWAF (2005) guidelines. The HGM units have been classified as one channelled valley bottom, four unchanneled valley bottom wetlands and a depression wetland. Multiple drainage features were also identified to the within the PAOI.

The topographical inland and river line data for "2527" quarter degree was used to identify potential wetland areas within the PAOI. This data set indicates multiple inland water areas of which were classified as being dams as well as multiple non-perennial river lines located within the PAOI.

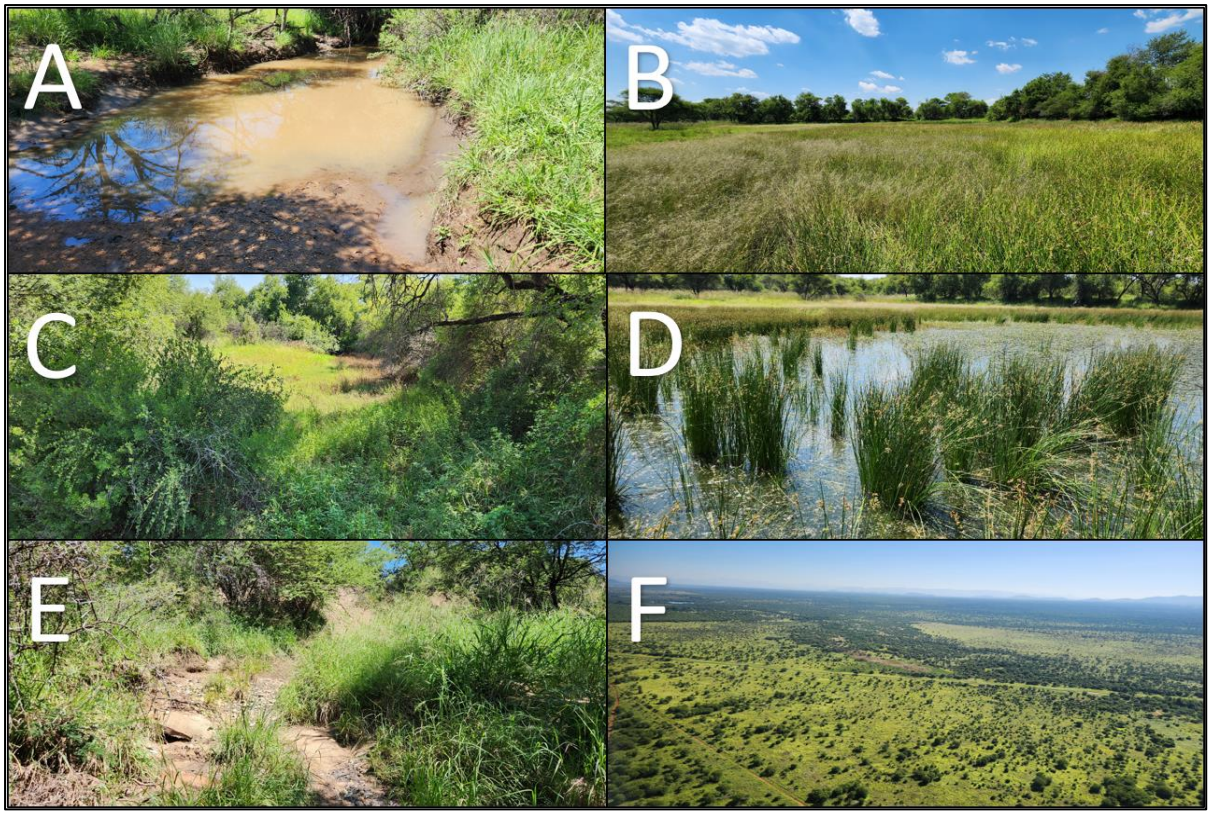


Figure 5.19: Photographical evidence of the different wetland types found within the project area of influence, A) Channelled valley bottom, B & C) Unchannelled valley bottom wetlands, D) Depression, E) Drainage features and F) Aerial photograph of a channelled valley bottom wetland.

Channelled valley bottom wetlands are typically found on valley floors with a clearly defined, finite stream channel and lacks floodplain features, referring specifically to meanders. Channelled valley bottom wetlands are known to undergo loss of sediment in cases where the wetlands' slope is steep and the deposition thereof in cases of low relief. Unchannelled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows. Depression wetlands are located on the "slope" landscape unit. Depressions are inward draining basins with an enclosing topography which allows for water to accumulate within the system. Depressions, in some cases, are also fed by lateral sub-surface flows in cases where the dominant geology allows for these types of flows. The DWAF (2005) manual separates the classification of watercourses into three (3) separate types of channels or sections defined by their position relative to the zone of saturation in the riparian area. The classification system separates channels into:

- those that do not have baseflow ('A' Sections);
- those that sometimes have baseflow ('B' Sections) or non-perennial; or
- those that always have baseflow ('C' Sections) or perennial.

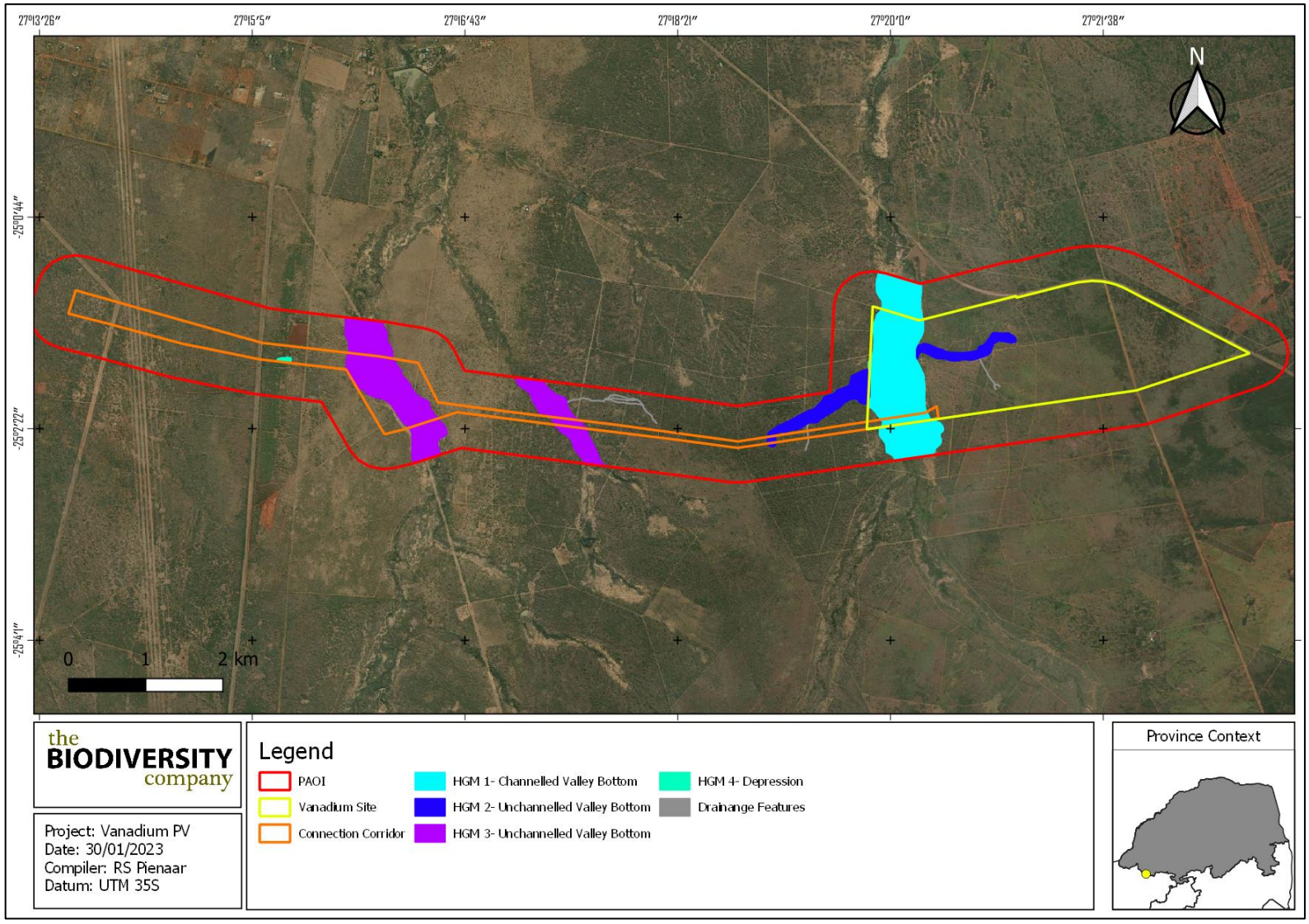


Figure 5.20: Delineation and location of the different HGM units identified within the PAOI.

Ecological Functional Assessment

The ecosystem services provided by the wetland units identified on site were assessed and rated using the WET-EcoServices method (Kotze *et al.,* 2008). The ecosystem services scores of the delineated wetlands ranges from low to high. Ecosystem services contributing to these scores include flood attenuation, streamflow regulation, sediment trapping, phosphate assimilation, nitrate assimilation, toxicant assimilation, erosion control, and provision of cultivated foods (Refer to figure 5.21).

Table 5.5: Average ecosystem service scores for delineated wetlands

Moderately High	Intermediate	Moderately Low
HGM 3	HGM 1	HGM 2
	HGM 4	

HGM 3 scored the highest ecological services scores due to its high volumes of hydrophyte vegetation. The wetland was classified as an unchannelled body that plays an important role in stream flow regulation and flood attenuation, this combined with the high hydrophyte vegetation gives this system good ecosystem services scores. The vegetation helps with the accumulation of toxicants from the environment and also provides resources.

HGM units 1 and 4 scored intermediate ecological services scores. These HGM units were classified as being a valley bottom wetland and a depression wetland where water will runoff to after heavy rains and plays an important role in flood attenuation and streamflow regulation. Although these wetlands have the same ability to regulate streamflow as HGM 3 they do not have the same amounts of hydrophyte vegetation and will thus have lower ecosystem services scores.

HGM 2 scored the lowest ecological services scores due to the lack of hydrophyte vegetation. The wetlands will still help with flood attenuation but to a much lesser extent than the other HGM units. wetlands will still help with flood attenuation but to a much lesser extent than the other HGM units.

Ecological Health Assessment

The delineated wetland systems have been scored overall PES ratings ranging from largely modified (class D) to seriously modified (class E), depending on the level of modification.

Table 5.6: Summary of the scores for the wetland PES

Largely Modified (D)	Seriously Modified (E)
HGM 1	HGM 2
HGM 3	
HGM 4	

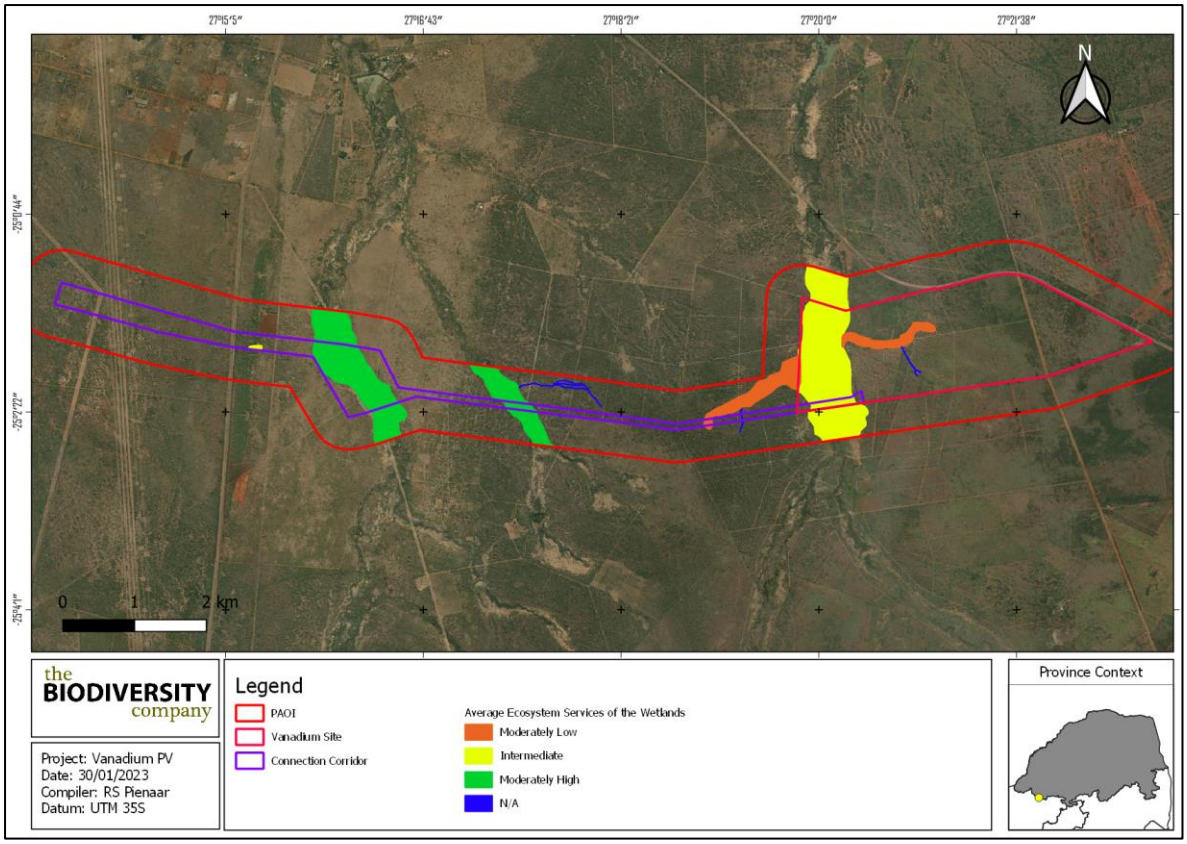


Figure 5.21: Average ecosystem services scores for the delineated wetlands

Ecological Importance and Sensitivity Assessment

Various components pertaining to the protection status of a wetland are considered for the IS, including Strategic Water Source Areas (SWSA), the NFEPA wetland vegetation (wet veg) threat status and the protection status of the wetland. The IS for all the wetlands have been calculated to be "Moderate", which combines the relatively High threat status and the low protection levels of the wetland.

Table 5.7: The Ecological Importance and Sensitivity results for the delineated HGM units

HGM Type	NFEPA Wet Veg			NBA Wetlands			SWSA (Y/N)	Calculated IS
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018	Ecosystem Protection Level		
Channelled Valley Bottom	Central Bushveld Group 3	Critical	Not Protected	N/A	N/A	N/A	N	**Moderate**
Unchannelled Valley Bottoms	Central Bushveld Group 3	Endangered	Moderately Protected	N/A	N/A	N/A	N	**Moderate**
Depression	Central Bushveld Group 3	Least Threatened	Poorly Protected	C Moderately Modified	Least Concerned	Poorly Protected	N	**Moderate**

5.3.1.4 Climate

This area is characterised by a summer rainfall with dry winters. May to August tends to be dry and cool, August to October is hot and dry whereas November to April is hot and wet, Mucina & Rutherford (2006). The mean annual precipitations for this region are between 500mm and 700mm with frost frequently occurring. The mean monthly maximum temperature (November) is 35.3˚C and 3.1˚C for the average minimum temperatures during June.

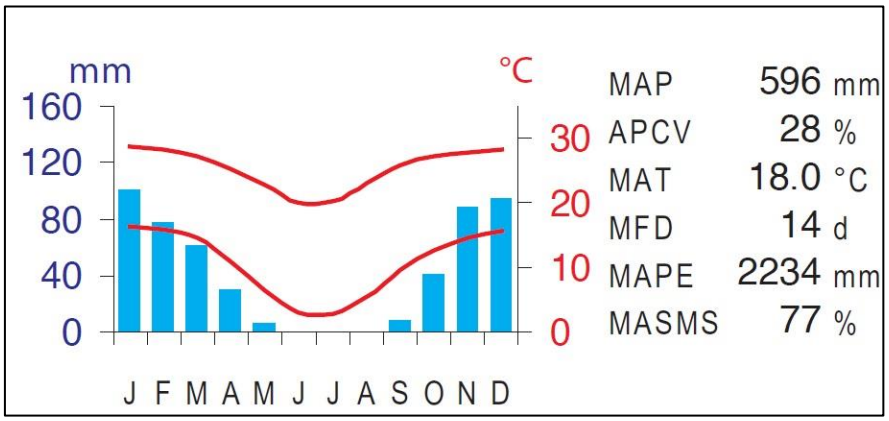


Figure 5.22: Climate diagram for the Central Sandy Bushveld (SVcb 12), Mucina & Rutherford (2006).

5.3.1.5 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life and birds on site. The following section will discuss the state of biodiversity on the site in more detail.

Avifaunal

According to the Avifauna Assessment (Appendix E2), Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity.

The selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels.

Figure 5.23 illustrates that the proposed development does not overlap any IBAs, however the Northern Turf Thornveld IBA is located approximately 4.5 km to the north-east.

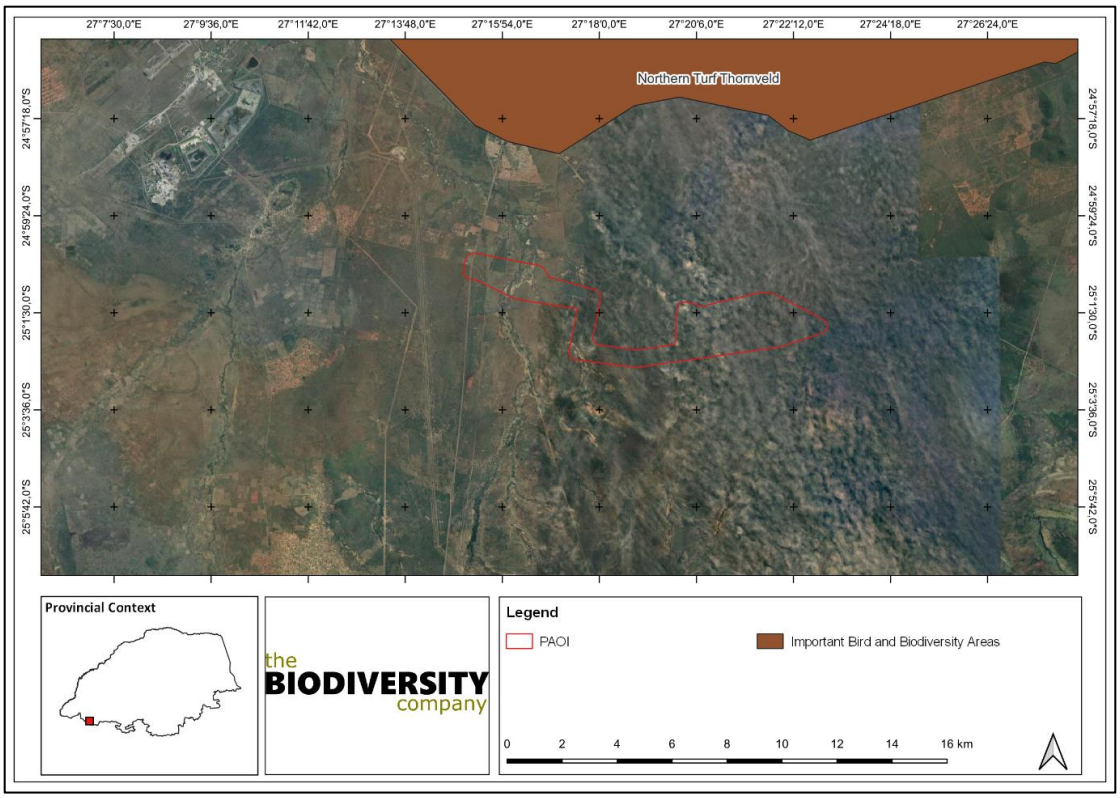


Figure 5.23: Map illustrating the location of Important Bird and Biodiversity Areas in relation to the proposed Vanadium Solar Power Plant PAOI

There are no sites proximal to the PAOI that are monitored as part of the CWAC project. The Vaalkop Dam in the North West Province is the nearest CWAC site and is located approximately 31 km to the south-east. The site was registered in 1993 and is a state dam on the Elands River, partly within Vaalkops Nature Reserve. It supports a diversity of waterbirds, but most waterfowl and shorebirds occur in small numbers. A nationally significant count of Podiceps cristatus (Great Crested Grebe) was recorded in winter 1995. Threats include microlight aircraft, boating and waste from anglers.

Expected Species of Conservation Concern

The SABAP2 Data lists 360 indigenous avifauna species that could be expected to occur within the PAOI and surrounding landscape. Twenty (20) of these expected species are regarded as SCC.

Table 5.8: Avifauna species of conservation concern that are expected to occur within the proposed Vanadium Solar Power Plant PAOI. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable.

Family	Scientific Name	Common Name	Conservation Status		Likelihood of Occurrence
			Regional	Global	
Accipitridae	*Aquila rapax*	Tawny Eagle	EN	VU	High
Accipitridae	*Aquila verreauxii*	Verreaux's Eagle	VU	LC	Low
Accipitridae	*Circus ranivorus*	African Marsh Harrier	EN	LC	Low
Accipitridae	*Gyps africanus*	White-backed Vulture	CR	CR	High
Accipitridae	*Gyps coprotheres*	Cape Vulture	EN	VU	Moderate

Family	Scientific Name	Common Name	Conservation Status		Likelihood of Occurrence
			Regional	Global	
Accipitridae	*Polemaetus bellicosus*	Martial Eagle	EN	EN	High
Accipitridae	*Torgos tracheliotos*	Lappet-faced Vulture	EN	EN	Moderate
Ciconiidae	*Ciconia abdimii*	Abdim's Stork	NT	LC	Moderate
Ciconiidae	*Leptoptilos crumenifer*	Marabou Stork	NT	LC	Moderate
Ciconiidae	*Mycteria ibis*	Yellow-billed Stork	EN	LC	Confirmed
Coraciidae	*Coracias garrulus*	European Roller	NT	LC	High
Falconidae	*Falco biarmicus*	Lanner Falcon	VU	LC	Confirmed
Glareolidae	*Glareola nordmanni*	Black-winged Pratincole	NT	NT	Low
Otididae	*Ardeotis kori*	Kori Bustard	NT	NT	Moderate
Phoenicopteridae	*Phoeniconaias minor*	Lesser Flamingo	NT	NT	Low
Pteroclidae	*Pterocles gutturalis*	Yellow-throated Sandgrouse	NT	LC	Confirmed
Rostratulidae	*Rostratula benghalensis*	Greater Painted-snipe	NT	LC	Low
Sagittariidae	*Sagittarius serpentarius*	Secretarybird	VU	EN	High
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	LC	NT	Low
Tytonidae	*Tyto capensis*	African Grass Owl	VU	LC	Low

The avifauna community recorded within the PAOI could be regarded as diverse with 108 species recorded, accounting for approximately 30% of the total number of expected species. The most speciose families were the *Cisticolidae* and *Malaconotidae*, with 7 species recorded for each family, accounting for a total of approximately 13% of the species recorded. Additional speciose families comprised of *Accipitridae* and *Cuculidae,* represented by 6 species each.

Three of the expected SCC, were recorded within the PAOI during the wet season survey period. These comprised of *Falco biarmicus* , *Pterocles gutturalis* and *Mycteria ibis.* Refer to figure 5.24 below.

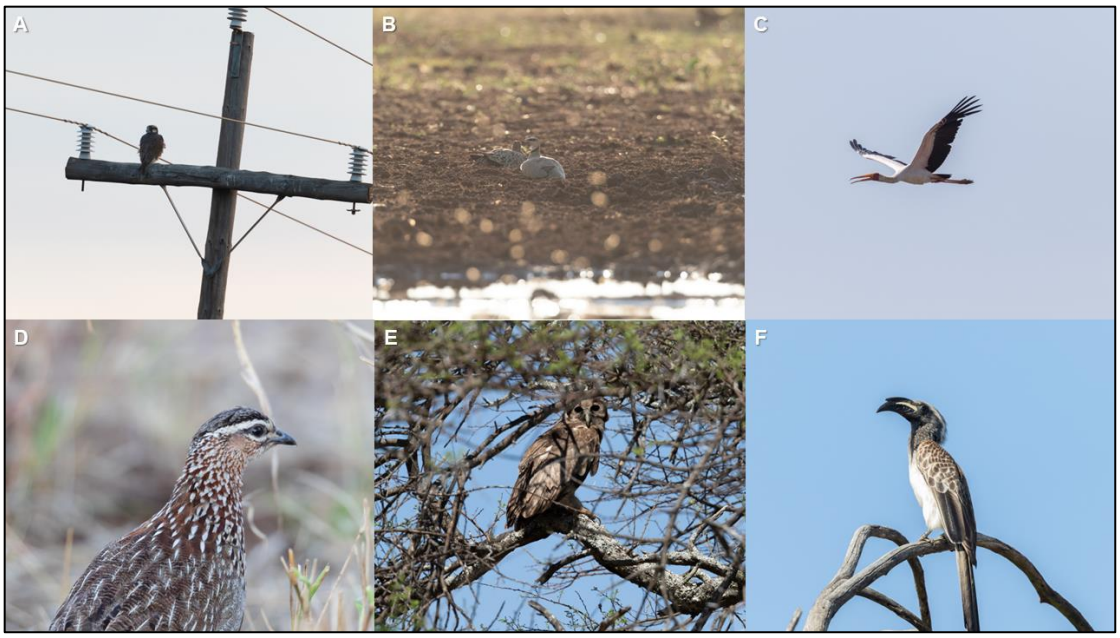


Figure 5.24: Photographs illustrating a portion of the avifauna recorded within the proposed Vanadium Solar Power Plant PAOI during the field survey. A) Falco biarmicus (Lanner Falcon), B) Pterocles gutturalis (Yellow-throated Sandgrouse), C) Mycteria ibis (Yellow-billed Stork), D) Dendroperdix sephaena (Crested Francolin), E) Bubo lacteus (Verreaux's Eagle-Owl) and F) Lophoceros nasutus (African Grey Hornbill

Fauna

According to the Terrestrial Biodiversity Impact Assessment (Appendix E1), mammal activity was high, where twenty-two (22) mammal species were recorded, either through direct observations or evidence of species. Three (3) reptile species were recorded and one (1) amphibian species were observed during the survey.

The species Panthera pardus (Leopard) was observed within the PAOI and is listed as VU both regionally and internationally. Additionally, Hippotragus niger (Sable Antelope) listed as VU regionally and LC internationally were also recorded across the PAOI but has been introduced as the area is utilised as a game farm.

Table 5.9: The fauna species recorded during the field survey

Species	Common Name	Conservation Status	
		SANBI (2022)	IUCN (2021)
Mammals			
Aepyceros melampus	Impala	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Chlorocebus pygerythrus	Vervet Monkey	LC	LC
Connochaetes taurinus	Blue Wildebeest	LC	LC
Damaliscus pygargus	Blesbok	LC	LC
Galago moholi	Southern Lesser Galago	LC	LC
Genetta maculata	Rusty-spotted Genet	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC

Hippotragus niger	**Sable Antelope**	**VU**	**LC**
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Kobus ellipsiprymnus	Common Waterbuck	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Mungos mungo	Banded Mongoose	LC	LC
Orycteropus afer	Aardvark	LC	LC
Panthera pardus	**Leopard**	**VU**	**VU**
Papio ursinus	Chacma Baboon	LC	LC
Paraxerus cepapi	Tree Squirrel	LC	LC
Phacochoerus africanus	Common Warthog	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Tragelaphus angasii	Nyala	LC	LC
Tragelaphus strepsiceros	Greater Kudu	LC	LC
	Reptiles		
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Varanus albigularis	Rock Monitor	LC	Unlisted
	Amphibians		
Schismaderma carens	African Red Toad	LC	LC

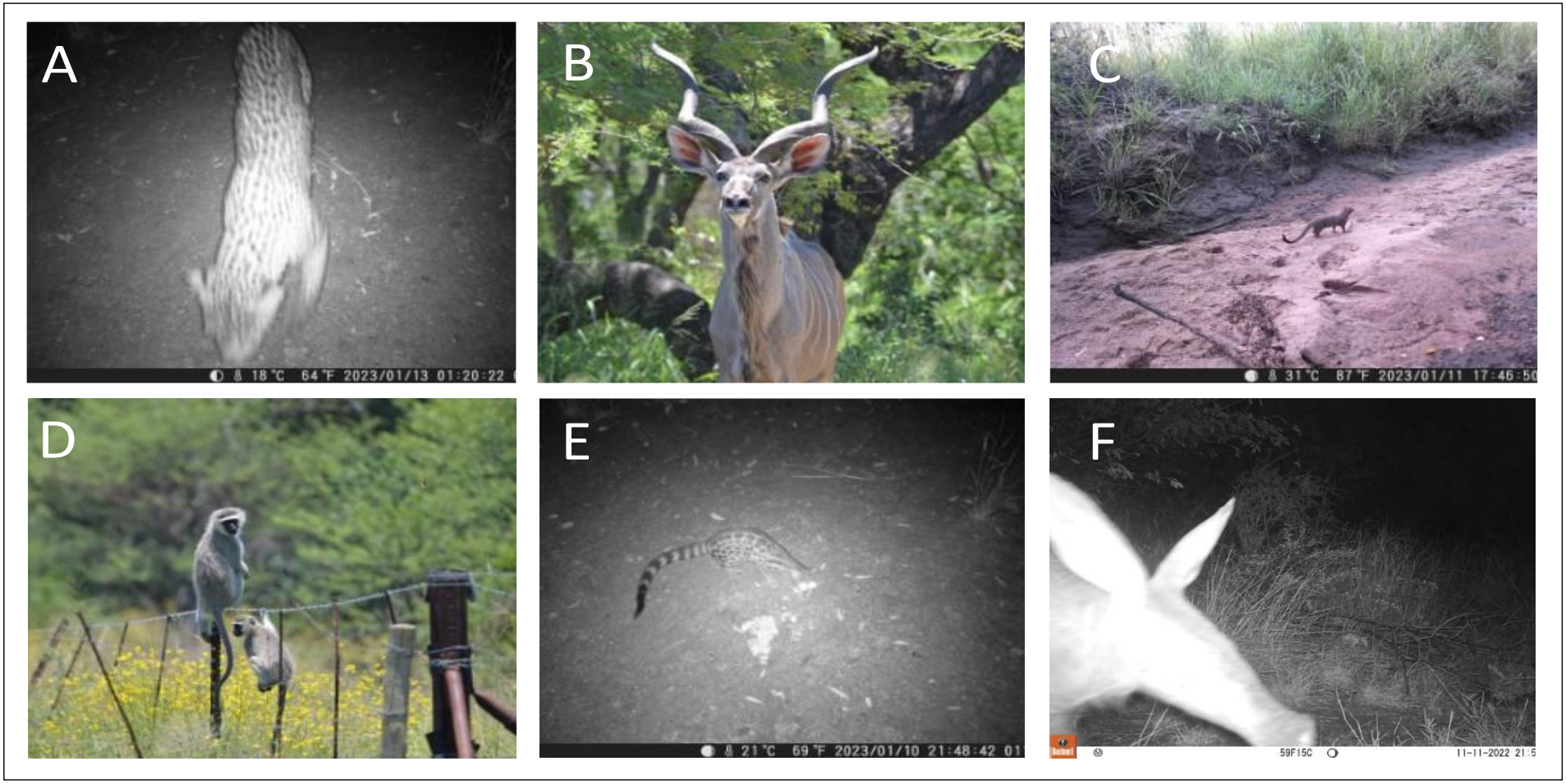


Figure 5.25: Photographs: Mammal species recorded during the survey – A) Panthera pardus (Leopard) (VU); B) Tragelaphus strepsiceros (Greater Kudu); C) Herpestes sanguineus (Slender Mongoose); D) Chlorocebus pygerythrus (Vervet Monkey); E) Genetta maculate (Rusty-spotted Genet) and F) Orycteropus afer (Aardvark).

5.3.1.6 Visual landscape

The It is possible that landscape change due to the proposed development could impact the character of an important landscape area. Importance can be derived from specific features that can relate to urban or rural settings. They might include key natural, historic or culturally significant elements. Importance might also relate to landscapes that are uncommon or under threat from development.

Generally, the most significant natural areas are afforded a degree of legal protection such as National Parks and Reserves; however, they might also have local significance and not be protected.

The proposed SPP is in an area with relatively low significance in elevation except approximately 1.7km to the east and 2.9km to the south-east where some scattered ridges are located. The ridges form part of the outskirts of the Waterberg Mountain Range. The site itself has a difference in elevation of approximately 40 meters. The SPP is located at an above mean sea level (amsl) of approximately 1105m at the highest elevation and at an amsl of 1065m at the lowest elevation. The SPP drains towards the west. The power line corridor has a difference in elevation of approximately 50 meters. The PL corridor is located at an above mean sea level (amsl) of approximately 1088m at the highest elevation and at an amsl of 1038m at the lowest elevation. The PL corridor drains towards the west. Refer to Figure 5.26 for a representative photograph of the site.

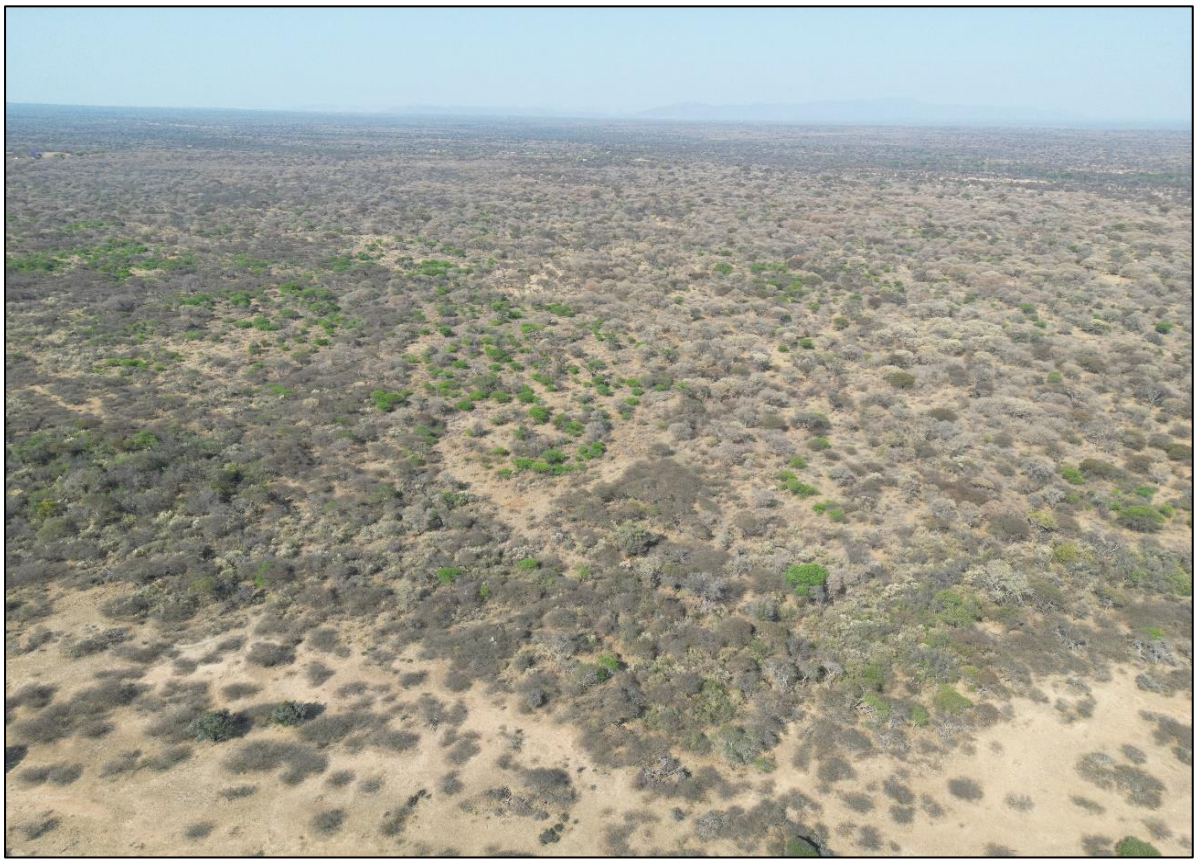


Figure 5.26: Centre of the site taken towards the south-west. 100m Above Ground Level

A Zone of Theoretical Visibility (ZTV) is a Geographic Information System (GIS)-generated tool to identify the likely (or theoretical) extent of visibility of a development. The tool used in this model does not take existing screening into account but only the above mean sea level of the landscape.

Table 5.11 provides the visibility ratings for the solar power plant and Table 5.12 provides the visibility ratings for the power line.

Table 5.10: ZTV Visibility rating in terms of Proximity to the Solar Power Plant

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- D1235 district road. **Coverage: 74.92%**	Very High
1-3km	- D1235 district road. **Coverage: 33.6%**	High
3-5km	No sensitive visual receptors within the visibility coverage. **Coverage: 18.09%**	Medium
5-10km	- 12 homesteads on farms. - R510 regional road. - Three lodging facilities. **Coverage: 10.91%**	Low

Table 5.11: ZTV Visibility Rating in terms of Proximity to the Power Line

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- R510 regional road. **Coverage: 98.51%**	Very High
1-3km	- Eight homesteads on farms. - R510 regional road. - D1235 district road. - Three lodging facilities. **Coverage: 76.69%**	High
3-5km	- 57 homesteads on farms. - D1235 district road. - R510 regional road. - Mononono. - One unnamed informal settlement.	Medium

	- Four lodging facilities. **Coverage: 54.31%**	
5-10km	- 40 homesteads on farms. - Northam. - Sefikile. - Ga-Ramosidi. - R510 regional road. - Manamakotheng. - Mawala Lodge air strip. **Coverage: 34.1%**	Low

Figure 5.29 and Figure 5.30 below indicates the Zone of Theoretical Visibility for the solar power plant and the proposed grid connection corridor.

The ZTV assessment did not consider existing screening such as buildings and vegetation cover but rather the terrain's above mean sea level (AMSL) which indicates line of sight.

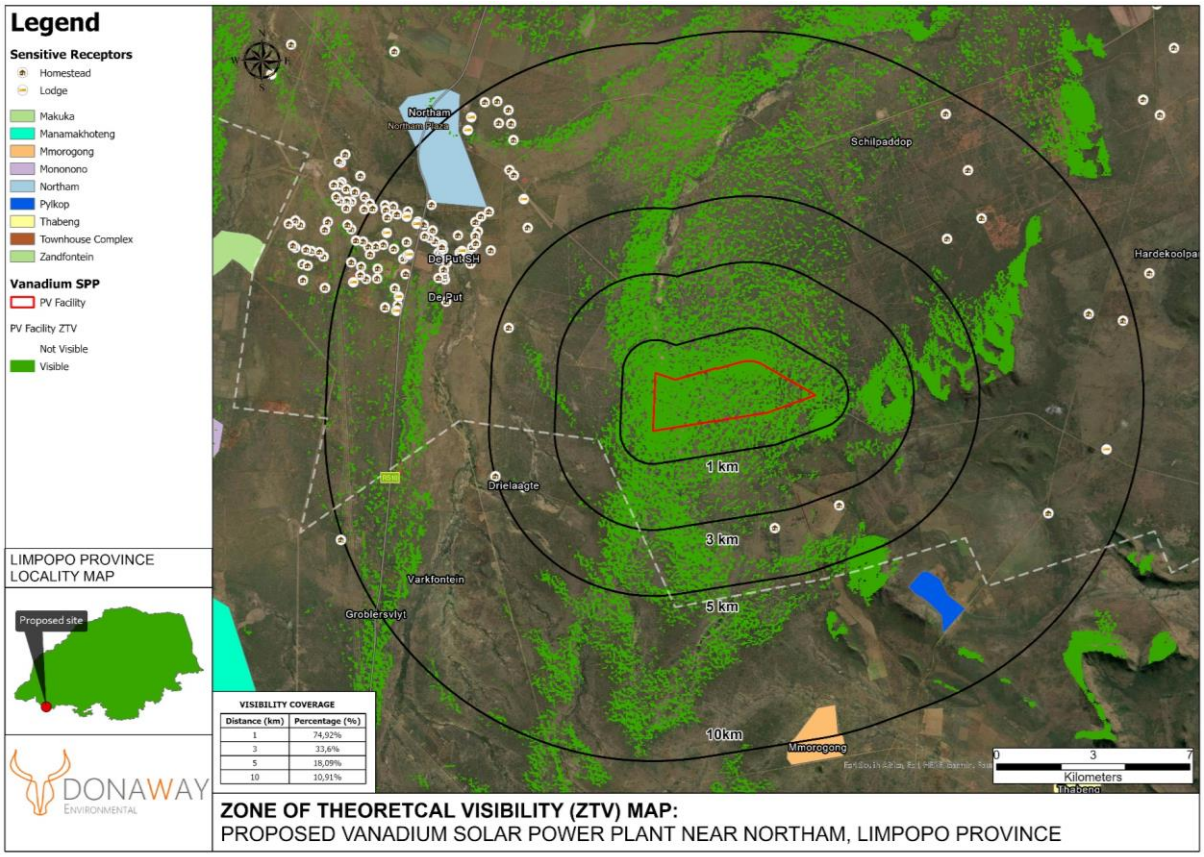


Figure 5.27: Zone of Theoretical Visibility (ZTV) for the Vanadium Solar Power Plant.

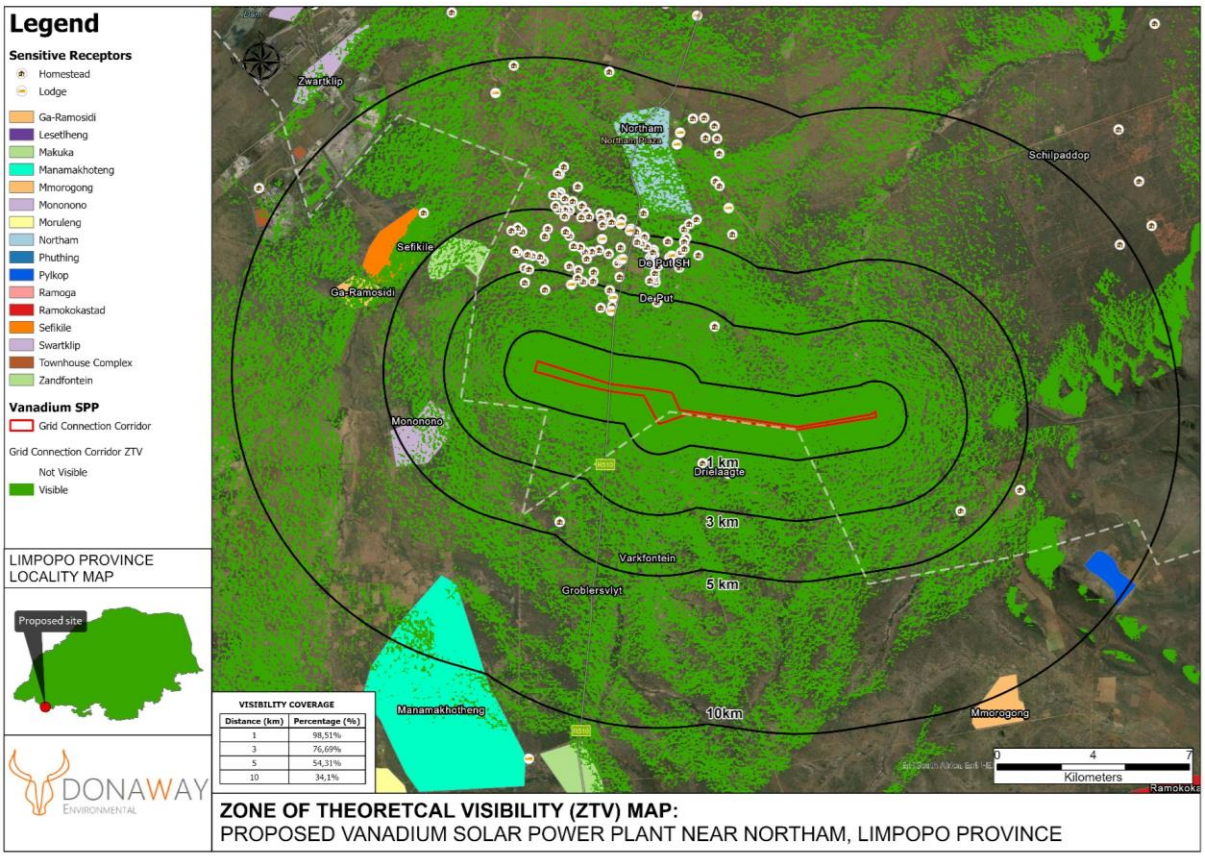


Figure 5.28: Zone of Theoretical Visibility (ZTV) for the proposed grid connection corridor.

5.3.1.7 Traffic consideration

According to the Traffic Impact Study (Appendix E8), Several access options have been investigated, taking into consideration:

- Any existing access gates that could be used;
- Minimum access spacing requirements that need to be kept;
- Required sight lines that need to be ensured;
- Road safety considerations; as well as
- An existing rail line that runs along the eastern side of the R501, which limits accessibility to the site.

Taking the above into account, two access point as shown in Figure 5.31 are recommended.

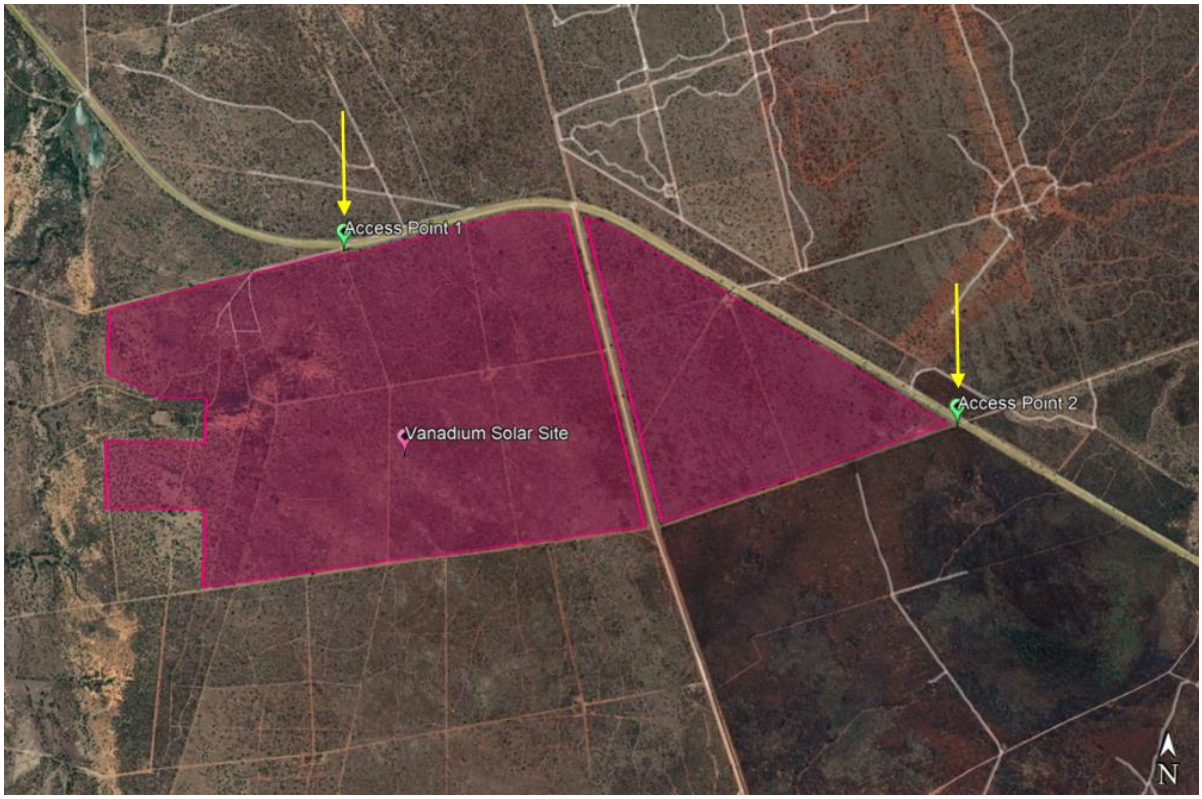


Figure 5.29: Aerial view of recommended access points for Vanadium SPP

This location is accessible from a surfaced service road. Access Point 1 is located at an existing farm gate. Sight lines from this access point are acceptable in both directions. Access point 2 is located approximately 3.3 km from access point 1 in an eastern direction on the service road. This access point doesn't exist yet and would need to be constructed to tie in with the existing farm road on site. Sight distances are good in both direction at this location.

It is assumed that the materials, plant, and workers will be sourced from the surrounding towns as far as possible, such as the Northam area. In terms of the National Land Transport Act (NLTA) (Act No.5 of 2009), the assessment of available public transport services is included in this report. The following comments are relevant in respect to the public transport availability for the proposed developments. It is expected that minibus taxis and buses frequent the N12 and R501. The R501 is located around 5 kms from the site. However, the developer of a large-scale project, such as many renewable energy projects, will provide shuttle buses or similar for workers during the construction phase.

It is envisaged that the components to be imported to South Africa, will arrive either via the Port of Richards Bay or the Port of Durban, as these two ports are the closest to the site.

In South Africa, more than half (52%) of the manufacturing industry's national workforce resides in three metros - Johannesburg, Cape Town, and eThekwini. It is therefore anticipated that elements ,that can be manufactured within South Africa, will be transported to the site from the Cape Town, Johannesburg, or Pinetown/Durban areas. Components will be transported to site using appropriate National and Provincial routes. It is expected that the components will generally be transported to site with normal heavy load vehicles.

The construction vehicles for the proposed Vanadium SPP will take access either via the R501 or R511 towards the site. According to the road classification of the surrounding road network as per the Road Infrastructure Strategic Framework for South Africa (RISFSA) and COTO's TRH26 South African Road Classification and Access Management Manual, the R501 and R511 can be classified as a Class 2 rural major arterial.

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route.

5.3.2 Description of the socio-economic environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

5.3.2.1 Socio-economic conditions

Limpopo, South Africa's northernmost province, borders onto Mozambique, Zimbabwe and Botswana. It also borders the Mpumalanga, Gauteng and North West provinces. Named after the Limpopo River, which flows along its northern border, it is a region of contrasts, from true Bushveld country to majestic mountains, primeval indigenous forests, unspoiled wilderness and patchworks of farmland. In the eastern region lies the northern half of the magnificent Kruger National Park.

Limpopo ranks fifth in South Africa in both surface area and population, covering an area of 125 754km² and being home to a population of 5 779 090. The capital is Polokwane (previously Pietersburg). Other major cities and towns include Bela-Bela (Warmbad), Lephalale (Ellisras), Northam Louis Trichardt, Musina and Tzaneen.

Mining is the primary driver of economic activity. Limpopo is rich in mineral deposits, including platinum-group metals, iron ore, chromium, high and middle-grade coking coal, diamonds, antimony, phosphate and copper, as well as mineral reserves such as gold, emeralds, scheelite, magnetite, vermiculite, silicon and mica. The province is a typical developing area, exporting primary products and importing manufactured goods and services.

The climatic conditions in the province allow for double harvesting seasons, which results in it being the largest producer of various crops in the agricultural market. Sunflowers, cotton, maize and peanuts are cultivated in the Bela-Bela–Modimolle area. Bananas, litchis, pineapples, mangoes and pawpaws, as well as a variety of nuts, are grown in the Tzaneen and Northam areas. Extensive tea and coffee plantations create many employment opportunities in the Tzaneen area. The Bushveld is cattle country, where controlled hunting is often combined with ranching.

Limpopo is divided into five district municipalities, which are further subdivided into 22 local municipalities

<u>Waterberg District Municipality</u>

The Waterberg District Municipality is a Category C municipality located in the western part of the Limpopo Province. It is strategically located in sharing its borders with Capricorn District Municipality in the north and Sekhukhune District Municipality in the east. The south-western boundary abuts the North West, while the Gauteng Province lies on the south-eastern side.

The municipality is the biggest district in the province, making up just more than a third of its geographical area. It shares its five-border control points with Botswana, namely Groblersbrug,

Stockpoort, Derdepoort, Zanzibar and Platjan. It is comprised of five local municipalities: Bela-Bela, Lephalale, Modimolle-Mookgophong, Mogalakwena and Northam.

The region, as we know it today, is more than three million years old. With its great variety of wildlife, birds and scenic splendour. It is one of South Africa's prime ecotourism destinations. It covers a geographical area of 25 596km² and is predominantly rural. It is a legendary cultural hub, and a catalyst for agricultural and tourism development. The main towns in the municipality include: Amandelbult Mine Town, Bela-Bela, Lephalale, Modimolle, Mokopane, Mookgophong, Pienaarsrivier, Northam, Vaalwater. The main economic sectors are mining, agriculture and tourism

Thabazimbi Local Municipality

The Thabazimbi Local Municipality is a Category B municipality located within the Waterberg District in the south-western part of the Limpopo Province. It has Botswana as its international neighbour and is a mere two-hour drive from Pretoria. It is one of five municipalities in the district.

Thabazimbi is known as ‘mountain of iron', which is a Setswana name referring to the highly lucrative iron ore reef first discovered in the municipality in 1919. The municipality has Marakele National Park, which is a subsidiary of the National Parks Board, and in the same standard as the Kruger National Park and Mapungubwe. It has been mined since the 1930s, when iron and steel production started. Apart from iron ore, the Thabazimbi Municipality is surrounded by platinum-producing areas. Other minerals produced in the area include andalusite.

Agriculture has also proven to be a strong economic sector in the municipality. Agricultural commodities produced are wheat, beans and maize. The municipality's goals are aligned with those of the Provincial Growth and Development Strategy in Limpopo. This will ensure that the growth trajectory also addresses the objective of poverty eradication through job creation and business opportunity stimulation.

The main economic sectors in the municipality are mining, agriculture and tourism.

5.3.2.2 Cultural and heritage aspects

According to the Heritage Impact Assessment (Appendix E5), the proposed development area is located close to the town of Northam in the Limpopo Province. The topography of the study & proposed development area is mostly flat and open, with no rocky outcrops, ridges or hills present. The area is also characterized by red sandy soils in some sections and black turf soils in others. The study & development area has been extensively impacted in the recent past by agricultural activities that included ploughing and crop growing, as well as livestock (cattle) breeding/herding and grazing. The related farmsteads/homesteads also had an impact, but to a lesser degree. Many of the heritage resources present in the area are related to the earlier farming activities here. The existing ESKOM powerlines and servitudes also impacted the study area in general to some degree.

Stone Age

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided into three periods as listed below. It is important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

- Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago

- Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
- Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

No Stone Age sites (including rock art) are known to occur in the immediate study area. The closest known Stone Age sites (Early to Later Stone Age) are found close to Rooiberg and Thabazimbi at sites called Blaauwbank & Olieboomspoort (Bergh 1999: 5).

No Stone Age sites and scatters of Stone Age material (stone tools) were identified in the study area during the December 2022 field assessment. One site with a scatter of MSA/LSA stone tools were identified during a recent HIA on the farm Haakdoornfontein 12JQ (Pelser 2021: 26-27).

Iron age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts. In South Africa it can be divided in two separate phases (Bergh1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

There are no known Iron Age sites (EIA or LIA) in the immediate study area, although a large number of EIA to LIA sites are known to exist in the larger geographical landscape in which the study area falls. The closest and best-known Iron Age site is located at Rooiberg near Thabazimbi to the north of the study area (Bergh 1999: 7).

The closest Early Iron Age site is located at Broederstroom near Brits (Bergh 1999: 6). In a band stretching from Pretoria to Brits as many as 125 Late Iron Age sites have been identified and many more between Brits and Rustenburg (Bergh 1999: 7). Tswana chiefdoms flourished in the area during AD 1600 to 1840 (Pistorius 2009: 18). Late Iron Age sites are also known between Brits and Thabazimbi (Bergh 1999: 7).

At the beginning of the 19th century different Tswana groups settled in the larger area. It includes the Kwena, Po and Kgatla. During the so-called difaqane (period of war or stress) they fled to the north-west and the Ndebele of Mzilikazi settled in around the Brits area and further north between 1827 and 1832 (Bergh 1999: 10-11, 106-107, 111; Pistorius 2009: 18-19).

Tom Huffman's research work shows that Iron Age sites, features or material could possibly be found in the area (based on pottery analysis combined with radiocarbon dates from related sites). This could include the so-called Moor Park facies of the Urewe Tradition dating to between AD1350 and AD1750 (Huffman 2007: 159); Uitkomst facies of the same tradition dating to between AD1650 and AD1820 (p.171); Rooiberg facies of Urewe dating to between AD1650 and AD1750 (p.175); the Oilfantspoort & Madikwe facies of the Urewe tradition both dating t between AD1500 and AD1700 (p.191 & 199);

the Buispoort facies of Urewe dating to between AD1700 and AD1840 (p.203); the Diamant facies of the Kalundu Tradition dating to between AD750 & AD1000 (p.223) and finally the Eiland facies of the same tradition dating to between AD1000 and AD1300 (Huffman 2007: 227).

No Iron Age sites, features or material were identified in the area during the December 2022 assessment. With no rocky ridges or hills present in the area, and therefore little or no building material available for the construction of the typical Late Iron Age stone-walled settlements, it is unlikely that LIA sites would be present here. Large parts of the study & development area is also characterized by turf-soils, and this would also have inhibited building. Areas like these could rather have been favored for livestock grazing & agricultural purposes as is the case in recent historical times. However, during earlier assessments in the larger area, and again on the farm Haakdoornfontein 12JQ, some Iron Age-related material (mostly pottery and grinding stones) were identified (Pelser 2021: 26-30)

Historic age

The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. The first European group to pass close by the area were that of Cowan & Donovan in 1808, followed by Scoon & McLuckie in 1829, Hume & Scoon in 1835 and by the famous Dr. David Livingstone in 1847 (Bergh 1999: 12-14).

The information below was obtained from a HIA Report by Dr.Julius Pistorius done in 2013 for Samancor's proposed Mining Right Application for Portions of the farm Varkensvlei 403KQ and Nooitgedacht 406KQ near Northam (p.22-23).

"It is highly unlikely that the Project Area was occupied by Early Iron Age (EIA) Bantu- Negroid people who lived elsewhere in the Limpopo, Mpumalanga, KwaZulu-Natal and North-West Provinces of South Africa during the 3rd to 9th centuries AD. The earliest Iron Age settlers who moved into the larger project area were Late Iron Age Sotho-speaking groups who belonged to the Moloko tradition. These Kgatla and Kwena communities are associated with stone walled settlements which date from AD1600 although earlier settlements, devoid of any stone walls, also probably occur in the region. Moloko sites have been recorded in Rooiberg, north of the Project Area, at the Pilanesberg and in Madibeng and Rustenburg further to the south where these sites are associated with kopjes and randjes. Iron Age settlements occur in the Ben Alberts Nature Reserve and elsewhere in the Thabazimbi district.

The Rooiberg area is also renowned for early tin mining activities, possibly dating from the Late Iron Age. It seems as if large quantities of tin ore were mined from the Rooiberg and transported to an unknown destination. The abundance of iron ore in the area, particularly around Thabazimbi, also led to the smelting of these ores by local Late Iron Age people in order to manufacture products such as weapons (spears) and tools (hoes, axes, etc.).

The closest towns to the Project Area are Thabazimbi and Northam. Thabazimbi's name is derived from the Tswana words for 'mountain of iron'. This was due to the discovery of the exceptionally rich iron ore deposits at Vliegpoort ('defile of flies') by the geologists J.H. Williams in 1919. The South African government bought the ore body and production for the Iscor Iron Ore mine in 1928. The mine started with its operations in 1931 A branch railway line was built from Northam to Thabazimbi on the Pretoria-Middelwit line. The town of Thabazimbi was laid out on the farm Kwaggashoek and proclaimed 23 on 4 May 1953. Millions of tons of iron ore are annually mined and hauled by train to Vanderbijlpark and New Castle.

The town of Northam was laid out by E.H. Fulls on the farm Leeukoppie and formally proclaimed in 1946. This farm together with several others was owned by H. Herd who had purchased the properties from British soldiers to whom they have been allocated after the Anglo Boer War. Herd was allowed to choose the name for the new village which he called Northam after the village Northam in Devonshire, England".

No historical sites or features are indicated on any of these maps.

Stone age

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided into three periods as listed below. It is important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

- Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago
- Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
- Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

There are no known Stone Age sites in the specific study and development area, with the closest ones found east of Northam and north of Nylstroom. These sites date to between the Middle and Later Stone Ages (Bergh 1999: 4).

Some Stone Age sites and scatters of Stone Age material (stone tools) were identified in the study area during the November 2022 field assessment.

Iron age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts. In South Africa it can be divided in two separate phases (Bergh1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

Again, for the Iron Age, none is known in the area (Bergh 1999: 7), and none was found during the assessment. The closest Early Iron Age site is located at Broederstroom near Brits (Bergh 1999: 6). An early (prehistoric) trade route passed by Buyskop near Northam to the Rooiberg/Thabazimbi area (Bergh 1999: 9). At the start of the 19th century the Kgatla group was living in the general geographical area (p.10). According to the work done by Huffman on Iron Age pottery, it is possible that Iron Age sites related to the following industries could be present in the larger area. This is the Uitkomst facies of the Urewe Tradition dating to between AD1650 & 1820; the Rooiberg facies of the same dating to

between AD1650 & 1750; the Madikwe facies also of Urewe (AD1500 – AD1700) and finally the Buispoort facies of Urewe dating to between AD1700 & 1840 (Huffman 2007: 171; 175; 199 & 203).

No Iron Age sites, features or material were identified in the area during the November 2022 assessment. With no rocky ridges or hills present in the area, and therefore little or no building material available for the construction of the typical Late Iron Age stone-walled settlements, it is unlikely that LIA sites would be present here. Large parts of the study and development area is also characterized by turf-soils, and this would also have inhibited building. Areas like these could rather have been favoured for livestock grazing and agricultural purposes as is the case in recent historical times.

Site specific assessment

Dense vegetation cover at the time of the assessment limited visibility on the ground and in some respects hampered access to some sections. However, large parts of the study and development area has been fairly extensively impacted in the recent past through agricultural activities such as cattle/livestock farming and grazing, with some old fields for pasture also present. Other impacts include the related farmsteads/homesteads and Eskom Powerlines and servitudes. The fact that the study and development area is also mostly flat (with no rocky outcrops, ridges or prominent hills present), as well as the mostly red sandy soils and turf characterizing the topography and natural stratigraphy of the area would mean that Late Iron Age stone-walled settlement remains are unlikely to occur in the area. These settlements typically tend to concentrate on and around rocky ridges and prominent hills. Landscapes such as these would also have been utilized mainly for cattle/livestock grazing and limited crop raising and growing in pre-historical times.

All the cultural heritage resources recorded in the area during the assessment dates to the recent historical past, with these sites known to the property owners and their representatives and indicated to the Heritage Specialist. No other sites or features are known to occur in the area and none over and above the recorded ones were identified.

Site 1 - Graves

This site is located on Makayskraal and contains between 4 and 5 stone-packed graves with no headstones (Figure 5.30). There is a possibility of more graves but grass cover hampered visibility on the ground. The identity and age of the graves are not known, but they most likely belong to farmworkers who worked and had settled on the farms.

As the graves are unknown in terms of their age they are deemed as older than 60 years of age until proven otherwise through consultation. During an earlier land claim process the BaPhalane initially indicated that these graves belong to their community members, but this claim was later retracted.

Graves always carry a ***High Significance*** rating from a Cultural Heritage perspective and therefore all possible care should be taken to avoid and impacts or damage to sites such this by any development actions.

Figure 5.30: View of the graves found on site (Site 1)

Site 2 – Ruins of farmworker homestead

This site contains the ruins of what is possibly a farmworker's homestead. It is constructed of bricks and cement, with plastered walls. The hollow bricks found alongside indicates that it is probably less than 60 years of age. The site is ***not deemed of any heritage significance*** and no mitigation measures are required to protect it against the impacts of development. The documentation conducted during the Phase 1 HIA assessment is seen as sufficient (Figure 5.31).

Figure 5.31: View of the ruins of farmworker homestead (Site 2)

Site 3 – Ruins of Farmstead and related features

This site contains a number of buildings and farming-related features, including the homestead, outbuildings, cement dam, outside bathroom/toilet and other structural remains. The site is also located on Makayskraal.

The age of the structures/homestead at the site is not known, could originally have been older than 60 years of age. Some additions and alterations were more than likely undertaken over the years. Most of the structures are not well preserved and have been vandalized (elements such as doors, roofing, handles, window frames etc.) having been removed. The site is based on that deemed of ***low significance*** and can be demolished should the proposed development directly impact on the site.

Site 4 – Remains of old farm dams

These are the remains of old soil and cement/concrete-walled dams that were constructed between the 1915's/1920's according to Mr. Francois Swart (owner of the properties). As such this site is of ***relatively high heritage significance*** although the feature/s are not in good state of preservation and highly visible as a result of soil erosion and dense vegetation cover.

If the site and dam features are going to be directly and negatively impacted by the proposed development it is recommended that it be mapped and recorded in detail before demolition and that a demolition permit be obtained from SAHRA to do this. If the site can be excluded from the development with a buffer zone placed around it then it is recommended that it should be included in a CHMP for the area.

Site 5 – Bush Camp

This bush camp with it associated structures are located on Tusschenkomst is ***not of any historical origin or heritage significance*** (Figure 5.32).

Figure 5.32: View of the Bush Camp on the Farm Tusschenkomst (Site 5)

Site 6 – Farmstead & Related infrastructure

This site located on Uitduiker contains a number of buildings and structures associated with a dairy and piggery on the farm, including a large dam and livestock enclosures. It is not old (less than 60 years of age) and ***not of historical or cultural heritage significance***. The documentation done during the Phase 1 HIA is seen as sufficient and should the proposed development directly impact on the site it can be demolished and no further mitigation measures are required.

Site 7 – Historical Farmstead and Related infrastructure

This site – also located on the farm Uitduiker – is located in fairly close proximity to Site 6. It contains an historic farmhouse and associated outbuildings and features. Although the exact age of the original farmhouse is not known, it could date from around the late 19th/early 20th to mid-20th centuries based on building style and some architectural elements. It has however been extensively altered over the years, with large sections fairly modern and less than 60 years of age.

Although the site might fall outside of the direct area of impact by the proposed development it is recommended (based on the historical origin and age of the structure) that the site be documented in detail by an architectural historian before it falls into complete disrepair and disappears from the historical landscape. Based on its age, and the fact that not many of these types of Farmsteads are still present in the larger geographical landscape the site given a ***Heritage Rating of between Medium and High***.

Site 8 – Grave/s

This grave site contains a grave demarcated by a cement slab and headstone inlaid with slate. It is the grave of one Hermina Catharina De la Rey Wolfaardt and a date of 1919 is visible on the inscription. It is assumed that this is the Date of death. The grave is therefore older than 60 years of age and protected under the NHRA (Act 25 of 1999).

Another granite headstone was also identified on the site. This is for the 2 dogs of J.M. Lundie (John Lundie) who used to live and farm here on this portion of Uitduiker. According to a representative of the current farm owner this headstone used to be located close to the homestead and must have been move to the cemetery by Mr. Lundie at some point. Mr. Lundie had also dug himself a burial pit at the site before he moved away from the farm recently, with the intention of being buried here when he passed away.

Although the site and grave will most likely not be directly impacted by the proposed development, graves and grave site always carry a ***High Significance Rating*** from a Cultural Heritage perspective. All care should therefore be taken not to impact the site and to avoid any damage to it.

Figure 5.33: The grave of Hermina Catharina De la Rey Wolfaardt at Site 8.

Site 9 – Old Quarry

This site is located on a portion of the farm Zwartdoorns. According to the representative/manager of the current farm owner (Mr. Francois Swart) this quarry was used to obtain material (gravel etc.) for the construction of the road/s in the area. The age is not known, but it is assumed to be less than 60 years old. There is no infrastructure associated with the quarry. The site ***does not have any historical origin or heritage significance*** and no mitigation measures are required for it.

Palaeontology

The geology of the proposed Vanadium Solar Power Plant near Northam in Limpopo is depicted on the 1: 250 000 Pretoria 2528 (1978) and the 2626 (1974) Thabazimbi Geological Map (Council for Geosciences, Pretoria). These maps indicate that the development is underlain by Nebo Granite (Mn) (Lebowa Granite Suite) and the Rustenburg Layered Suite (Vu, Vg) of the Bushveld Complex). Updated geology (mapped by the Council of Geosciences, Pretoria) is depicted in Figure 5 and indicates that the development is underlain by Nebo Granite and the Bierkraal Subsuite of the Bushveld Complex. The Palaeotechnical Report of the Limpopo Province (Groenewald et al, 2014) as well as the South African Heritage Resources Information System (SAHRIS) (Almond et al, 2013; SAHRIS website) allocates a Zero Palaeontological Sensitivity Bushveld Complex (Figure 5.34).

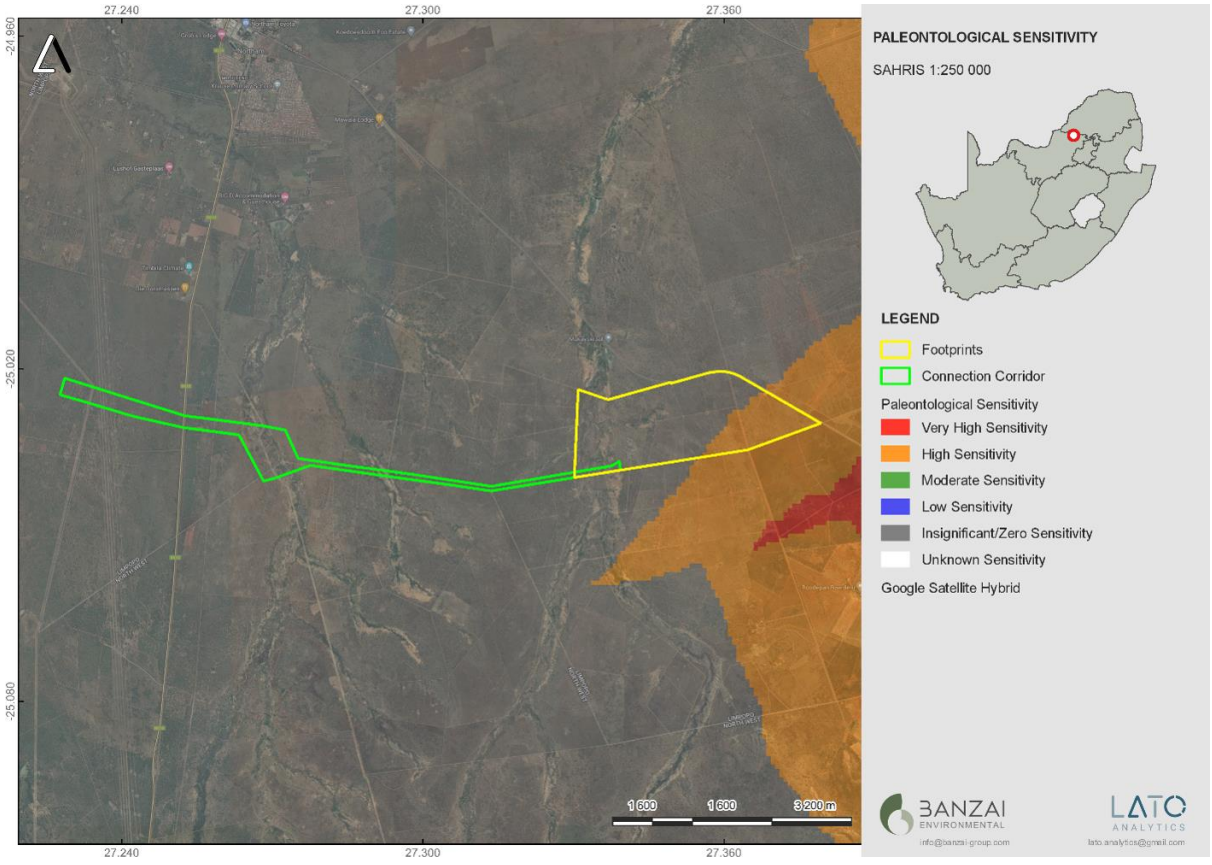


Figure 5.34: Extract of the 1: 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed Vanadium Solar development.

The Bushveld Complex comprise of the largest mafic intrusion in the world and underlie an area of almost 65 000 km^2. The maximum thickness of these rocks is almost 8 km while individual layers can be followed for about 150 km. This intrusion is world renowned for the ore reserves of platinum-group

elements namely chromium and vanadium. The Bushveld Complex is divided in 4 groups namely the Lebowa Granite Suite, Rashoop Granophyre Suite, Rustenburg Layered Suite and Rooiberg Group. The latter Group of felsic and minor volcanic rocks may be genetically closer related to the Bushveld event as to the Transvaal Supergroup (Hutton and Schweitzer, 1995). The Rustenburg Layered Suite reveals a complete differentiation sequence of magma and is made up of various rock layers ranging from dunite, gabbro, norite, and pyroxenite, and anorthosite to magnetite and apatite- rich diorite (Figure 5.35).

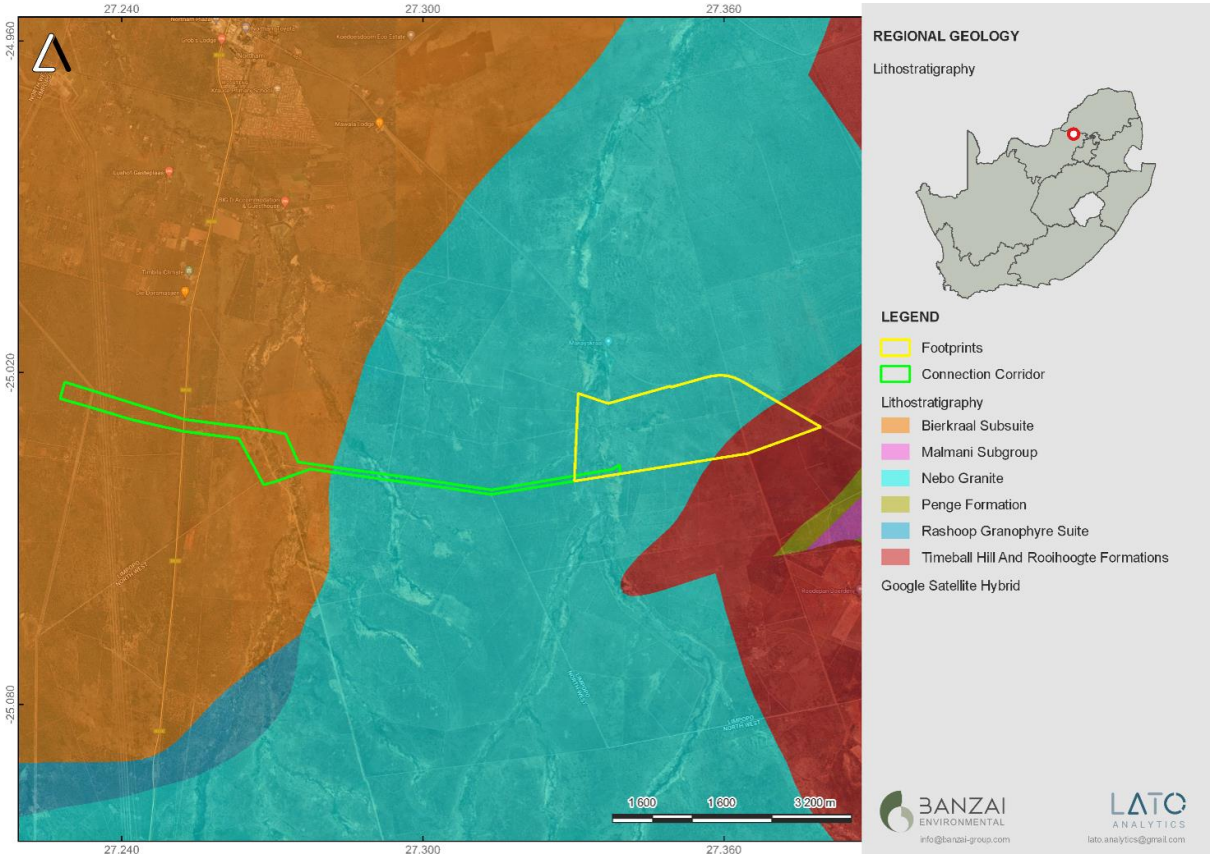


Figure 5.35: The updated Geology (Council of Geosciences, Pretoria) indicates that the proposed development is underlain by the Nebo Granite and the Bierkraal Subsuite of the Bushveld Complex.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the solar power plant is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid. Studies of solar irradiation worldwide indicate that the Limpopo Province has a high potential for the generation of power from solar.

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities (i.e. the grid connection points are located within the affected property which minimizes the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province, where the project is proposed to be

located is considered favorable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar power plant is directly dependent on the annual direct solar irradiation values of a particular area. The Limpopo receives high averages of direct normal and global horizontal irradiation, daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of ~2118 kWh/m^2/year is relevant in the area.

- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur. The topographic conditions, which are favorable, minimizes the significance of the impact that will occur during the clearing and leveling of the site for the construction activities.

- Extent of the site: A significant portion of land is required to evacuate the prescribed 150MW and space is a constraining factor in PV facility installations. Provision was made to assess a larger area than is required for the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province, and the development footprint assessed therein is considered to provide an opportunity for the successful construction and operation of a solar power plant with a capacity of 150MW, as well as opportunities for the avoidance and mitigation of impacts on the affected environment and sensitive environmental features.

- Site availability and access: The land is available for lease by the developer. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Proposed Access Alternative 1 has been identified by the client as the “preferred” access, to the southwest of the proposed site and is via an existing unsurfaced gravel road located on the eastern side of the R510. Proposed Access Alternative 2 is an (additional) access route that has been identified and is located to the west of the proposed site and is via the existing Unnamed Road and subsequent local gravel (i.e., “farm”) access roads.

- Grid connection: For the PV facility to connect to the national grid the facility will have to construct an on-site substation, Eskom switching station and a power line from the project site to connect to the Eskom grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site. Three grid connection options are available and all three are located within the same grid connection corridor which presents an opportunity for the consolidation of infrastructure and disturbance within the affected landscape.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 of this report. The area proposed for development exclusively consists of land used for game farming and other agricultural activities, but wetland features and a historical burial site are located on the development footprint, as well

as a few protected plant species, that will need to be considered by the developer for the placement of the facility infrastructure within the development footprint.

It is evident from the discussion above that on Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province may be considered favourable and suitable in terms of the site and environmental characteristics. As mentioned previously, no alternative areas on the property have been considered for the placement of the development footprint. The development footprint of this project will cover a significant portion of the farm; however, provision will be made to exclude any sensitive areas from the facility layout to be developed within the development footprint.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria, the site is identified as preferred due to fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of the 150 MW Vanadium Solar Power Plant on Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province, is the preferred option.

Considering the environmental sensitive features present within the development footprint, the Applicant has proposed a Final facility layout which considers these features, and thereby aim to avoid any direct impact on these features. The Final layout will be further assessed as part of the EIA Phase of the project. Refer to Figure H for the Final layout proposed for development.

6 DESCRIPTION OF THE IMPACTS AND RISKS

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(v) the impacts and risks identified for each alternative, including the nature, significance,

consequence, extent, duration and probability of the impacts, including the degree to which these impacts-

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;

(vii) positive and negative impacts that the proposed activity and alternatives will have on

the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(viii) the possible mitigation measures that could be applied and level of residual risk;

6.1 SCOPING METHODOLOGY

The contents and methodology of the scoping report aims to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation, and alert against the omission of possible impacts.
- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 28 September 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission

of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	×			Six HGM units were identified on site namely one channelled valley bottom, four unchanneled valley bottom wetlands and a depression wetland.
II. A conservation or open space area	×			The majority of the site is located on a Critical Biodiversity Area 1 (CBA 1), as well as Ecological Support Area 1 (ESA 1) and Other Natural Areas (ONAs).
III. An area that is of cultural importance	×			Stone-packed graves with no headstones (site 1) and old farm dams (site 4) were identified on site with a moderate to high cultural significance rating.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous Forest		×		None.
IX. Grass land	×			The site is located in the Central Sandy Bushveld which is classified as being vulnerable.
X. Bird nesting sites		×		The Avifaunal Assessment (refer to Appendix E2) indicated that no nests of SCC or priority species were recorded.

XI. Red data species	×			The Avifauna Scoping Assessment (refer to Appendix E2) recorded three SCC species on site which includes *Ciconiidae Mycteria ibis* (Yellow-billed Stork), *Falconidae Falco biarmicus* (Lanner Falcon) and *Pteroclidae Pterocles gutturalis* (Yellow-throated Sandgrouse). The Terrestrial Biodiversity Impact Assessment (Appendix E1) identified the *Panthera pardus* (Leopard), which is listed as Vulnerable.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			The VIA (refer to Appendix E3) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of 18-24 months. The noise impact is unlikely to be significant.
IV. Construction of an access road		×		Access will be obtained via a gravel road off of the connecting R510.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	×			Approximately 600 - 800 employment opportunities will be created during the construction phase and 99 employment opportunities during the operation phase of the SPP project.

VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during the facility's 20 years of production is approximately 7000m³ per annum.
VIII. Job creation	×			Approximately 600 - 800 employment opportunities will be created during the construction and 99 employment opportunities during the operational phases for the SPP.
IX. Traffic generation	×			It is estimated that 72 trips per day will be generated over the 18–24-month construction period for the SPP.
X. Soil erosion	×			The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		×		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			Six HGM units were identified on site namely one channelled valley bottom, four unchanneled valley bottom wetlands and a depression wetland.
II. A conservation or open space area		×		None.
III. An area that is of cultural importance	×			The Heritage Impact Assessment (Appendix E5) identified a grave site (Site 8) with high heritage or cultural significance within close proximity to the site.
IV. A site of geological significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.

VII. A tourist resort	×			The Mawala Lodge is located approximately 6km North of the proposed development.
VIII. A formal or informal settlement	×			The town of Northam located approximately 6km north-west of the proposed development.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in-depth assessment during the EIA process. An indication is provided of the specialist studies being conducted and which informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration, and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

To conceptualise the different impacts, the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor**: Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts**: Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation**: Impacts need to be mitigated to minimise the effect on the environment.

Please refer to **Appendix E** (specialist studies) a more in-depth assessment of the potential environmental impacts.

Table 6.2: Matrix analysis

For ease of reference the significance of the impacts is colour-coded as follow:

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Receptors	Impact description / consequence		Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* Activity 19 (GN.R. 327): *"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*	Site clearing and preparation Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community. • Introduction of IAP species and invasive fauna. • Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).		-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Terrestrial Biodiversity, Assessment (Appendix E1)
			Avifauna	• Habitat destruction • Destruction, degradation and fragmentation of surrounding habitats • Displacement of avifauna community • Direct mortality from persecution or poaching of avifauna species and collection of eggs • Direct mortality from increased vehicle and heavy machinery traffic		-	S	M	Pr	PR	ML	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E2)

cubic metres from a watercourse." *Activity 24 (ii) (GN.R 327): "The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."* Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."* Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."* Activity 4 (b)(i)(ee) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres*	circle for trucks will also be taken into consideration. Transportation and installation of PV panels into an Array The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw. Wiring to the Central Inverters Sections of the PV array would be wired to central inverters which have a maximum rated power of 2000kW each. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.		Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-
			Soil	• Loss of land capability	-		S	S	Pr	PR	ML	Yes	- See Table 6.3	L	Soil and Agricultural Assessment (Appendix E4)
			Geology	• Collapsible soil. • Seepage. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity.	-	-	S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	-
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality
			Groundwater	• Pollution due to construction vehicles and	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring	L	-

within (b) the Limpopo, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans." Activity 10 (b)(i)(ee)(hh) (GN.R 324): *"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) in the Limpopo, (i) outside urban areas,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* Activity 12 (b)(i)(ii)(vi) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Limpopo, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National*				the storage and handling of dangerous goods.									programme (quality and groundwater levels) should be designed and installed for the site. - Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards.		
			Surface water	• Altered surface flow dynamics; • Erosion; • Alteration of sub-surface flow dynamics; • Sedimentation of the water resource; • Direct and indirect loss of wetland areas; • Water quality impairment; • Compaction; • Decrease in vegetation; • Change of drainage patterns; • Altering hydromorphic properties; and • Indirect loss of wetland areas		-	L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Wetland Impact Assessment (Appendix E9)

Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland." Activity 14(ii)(a)(c)(b)(i)(ff) (GN.R 324): "*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 or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Limpopo, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* Activity 18 (b)(i)(ee)(hh) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) in the Limpopo (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within a watercourse or wetland; or within 100 metres from the*			General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. • Generation of hazardous waste		-	S	M	Pr	PR	ML	Yes	- Operators are trained and competent to operate the BESS. Training should include the discussion of the following: - Potential impact of electrolyte spills on groundwater; - Suitable disposal of waste and effluent; - Key measures in the EMPr relevant to worker's activities; - How incidents and suggestions for improvement can be reported. - Training records should be kept on file and be made available during audits. - Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. - Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the	L	-

edge of a watercourse or wetland."													duration of the project life cycle. Method statements should be kept on site at all times. - Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). - Firefighting equipment should readily be available at the BESS area and within the site. - Maintain strict access control to the BESS area. - Ensure all maintenance contractors / staff are familiar with the supplier's specifications. - Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and		

													appropriate actions should be taken to prevent these. - Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. - Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. - The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. - Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. - The applicant in consultation with the supplier must compile and implement a Leak		

													and Detection Monitoring Programme during the project life cycle of the BESS. - Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS. - Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. - The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.		
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	P	S	D	I	N/A	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E7)
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility.	-		L	S	D	CR	NL	Yes	- See Table 6.3	M	Visual Impact Assessment (Appendix E3)

				• Lighting impacts. • Solar glint and glare impacts. • Visual sense of place impacts.												
			Traffic volumes	• Construction and maintenance of gravel roads in vicinity of the site • Increased traffic on haulage routes • Increased traffic on local routes	-		L	S	Pr	CR	NL	Yes	- See Table 6.3	L	Traffic Impact Assessment (Appendix E8)
			Health & Safety	• Air/dust pollution. • Road safety. • Impacts associated with the presence of construction workers on site and in the area. • Influx of job seekers to the area. • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. • Increased risk of veld fires.		-	L	L	Pr	PR	ML	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E7)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.	L	Social Impact Assessment (Appendix E7)

			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• Loss or damage to sites, features or objects of cultural heritage significance	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E5)
			Paleontological Heritage	• Disturbance, damage or destruction of legally-protected fossil heritage* within the development footprint during the construction phase	-		S	P	U	IR	ML	Yes	N/A	L	Paleontological Impact Assessment (Appendix E6)
OPERATIONAL PHASE															
<u>Activity 11(i) (GN.R. 327):</u> *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* <u>Activity 1 (GN.R 325):</u> *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* <u>Activity 10 (b)(hh) (GN.R 324):</u> "*The development and related operation of facilities or infrastructure for the storage,*	The key components of the proposed project are described below: • <u>PV Panel Array</u> - To produce 150 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun. • <u>Wiring to Central Inverters</u> - Sections of the PV array will be wired to central inverters. The inverter is a	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Continued fragmentation and degradation of natural habitats and ecosystems. • Continuing spread of IAP and weed species. • Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).		-	L	L	Po	PR	ML	Yes	- See Table 6.4	L	Terrestrial Biodiversity, Animal and Plant Species Assessment (Appendix E1)
			Avifauna	• Collisions with infrastructure associated with the PV Facility • Electrocution due to infrastructure associated with the PV Facility • Direct mortality from persecution or poaching of avifauna species and collection of eggs		-	S	L	Pr	PR	ML	Yes	- See Table 6.4	L	Avifaunal Assessment (Appendix E2)

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) in the Limpopo (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."	pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. • <u>Connection to the grid</u> - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. • <u>Supporting Infrastructure</u> – Auxiliary buildings with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 820m². Other supporting infrastructure includes voltage and current regulators and protection circuitry. • <u>Roads</u> – Access will be obtained via gravel road off the R30. An internal site road network will also be required to provide access to the solar field and			• Direct mortality by roadkill during maintenance procedures • Encroachment of Invasive Alien Plants into disturbed areas										
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Loss of agricultural potential (low significance relative to agricultural potential of the site).		-	L	L	D	PR	SL	Yes	- See Table 6.4	L	Agricultural and Soil Compliance Statement (Appendix E4)
			Geology	• Collapsible soil. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	L	-
			Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils	-		L	L	Po	PR	ML	Yes	- All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable	L	-

	associated infrastructure. All site roads will require a width of approximately 6 m – 12 m. • Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.			can contaminate water supplies.									floor and sides) to prevent accidental discharge to groundwater.		
			Surface water	• Impact on the characteristics of the watercourse • Soil compaction and increased risk of sediment transport and erosion • Soil and water pollution • Spread and establishment of alien invasive species	-		L	L	Pr	PR	ML	Yes	- See Table 6.4	L	Wetland Impact Assessment (Appendix E9)
		SOCIAL/ECONOMIC	Visual landscape	• Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP. • Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP. • Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures. • Visual impacts and sense of place impacts associated with the operation phase of SPP.		-	L	L	D	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E3)

			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase.	-		L	L	Po	CR	NL	Yes	-	L	Traffic Impact Assessment (Appendix E8)
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• Loss or damage to sites, features or objects of cultural heritage significance	-		S	S	U	PR	ML	Yes	- See Table 6.4	L	Heritage Impact Assessment (Appendix E5)
			Electricity supply	• Generation of additional electricity. The power line will transport generated electricity into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Improvement of habitat through revegetation / succession over time • Soil erosion and sedimentation. • Spreading and establishment of alien invasive species		-	S	L	Po	N/A	N/A	Yes	- See Table 6.5	L	Terrestrial Biodiversity, Assessment (Appendix E1)

	Rehabilitation of biophysical environment The biophysical environment will be rehabilitated.			• Habitat degradation due to dust • Spillages of harmful substances • Road mortalities of fauna / impact of human activities on site.											
			Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills).		-	S	S	Pr	PR	M	Yes	- See Table 6.3	L	Agricultural and Soil Compliance Statement (Appendix E4)
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in stormwater run-off. • Pollution of water sources due to soil erosion.		-	L	S	Pr	PR	ML	Yes	- Removal of any historically contaminated soil as hazardous waste.	M	-

													- Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater (or surface water) contamination.		
			Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility. • The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, in the case of Vanadium SPP it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E3)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	L	Traffic Impact Assessment (Appendix E8)
			Health & Safety	• Air/dust pollution. • Road safety.	-		L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Social Impact Assessment

				• Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.											(Appendix E7)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E7)
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• It is not foreseen that the decommissioning phase will impact on any heritage resources.	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E5)

Nature of the impact:	(N/A) No impact	(+) Positive Impact (-)	Negative Impact	
Geographical extent:	(S) Site;	(L) Local/District;	(P) Province/Region;	(I) International and National
Probability:	(U) Unlikely;	(Po) Possible;	(Pr) Probable;	(D) Definite
Duration:	(S) Short Term;	(M) Medium Term;	(L) Long Term;	(P) Permanent
Intensity / Magnitude:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High
Reversibility:	(CR) Completely Reversible;	(PR) Partly Reversible;	(BR) Barely Reversible;	-
Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;	(CL) Complete Loss
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	-

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which should be addressed in more detail in the EIA report.

6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- *Activity 24 (ii) (GN.R 327):* *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*
- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."*

During the construction phase temporary negative impacts are foreseen over the short term. Table 6.3 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

Table 6.3: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Baseline and Impact Assessment (Appendix E1)	Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.	Negative High	Negative Medium	• Avoidance and Minimisation (High SEI Areas): Guidelines for development in high sensitivity areas require avoidance mitigation as much as possible. This must include concerted efforts to avoid these sensitive areas where feasible, and disturbances must be kept to an absolute minimum. Changes must be made to project infrastructure design to limit the amount of area/habitat impacted in relation to the title deed area (for example 10%). The minimisation of the disturbance footprint for example **is considered to be avoidance**, this will include brush cutting beneath panels as opposed to the complete clearance of vegetation. • Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. • All laydown, chemical toilets etc. should be restricted to medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable

				materials where possible. No storage of vehicles or equipment will be allowed outside of the designated PAOIs. • Any individual of the protected trees that are present needs a relocation or destruction permit in order for any individual to be removed or destroyed due to the development. High visibility flags must be placed near any protected trees in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. If the trees cannot be relocated seed must be collected and utilised as part of the rehabilitation process. • Existing access routes, especially roads, must be made use of. • All construction waste must be removed from site at the closure of the construction phase. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. • No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. • Litter, spills, fuels, chemical and human waste in and around the PAOI must be minimised and controlled according to the waste management plan. • Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers

				be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site. • A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • Only existing access routes and walking paths may be made use of. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc. • A stormwater management plan must be compiled and implemented
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	• An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place

				to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests. • Where a registered disposal facility is not available close to the PAOI, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days. • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the PAOI to inform contractors and site staff of the presence of sensitive flora and fauna species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr. • Contractors and employees must all undergo the induction and must be made aware of the sensitive areas to be avoided.
	Destruction of protected plant species	Negative High	Negative Medium	• See mitigation for destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.
	Displacement of the indigenous faunal community (including SCC)	Negative High	Negative Medium	• A qualified Environmental Control Officer must be on site when construction begins. A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably

	due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).			during the wet season. Should any SCC be noted and/or the animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • Clearing and disturbance activities must be conducted in a progressive linear manner, and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and • Signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.

				• Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in, and subsequently inspected prior to backfilling. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed every 50 m, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed.
Avifaunal Scoping Assessment (Appendix E2)	Destruction, fragmentation and degradation of habitats and ecosystems Direct mortality of avifauna Reduced migration of avifauna Environmental pollution due to water runoff, PV			• The PAOI is deemed to possess high sensitivity and is important in supporting species diversity. The development of the area will result in the loss of habitat for these species, most of which is in a largely natural condition. The construction of the SPP could also lead to the displacement and direct mortality of the avifauna and more specifically avifauna SCC. The associated grid infrastructure could also result in mortality from collisions and electrocutions.

	cleaning products, spills from vehicles and erosion			• The report submitted along with the Final Scoping Report is an Avifauna Scoping report. The full final report will be submitted with the Final Environmental Impact Report.
	Staff and others interacting directly with avifauna (potentially dangerous) or poaching of birds/eggs			
	Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, heat radiation and light pollution.			
Impact Assessment (Appendix E9)	Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility.	Negative Medium	Negative Low	• Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and the unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 25 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan. • All activities (including driving) must adhere to the 25 m buffer area.

				• Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed. • All alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. By this Eskom is obliged to control. • Landscape and re-vegetate all denuded areas as soon as possible.
	Increased erosion and sedimentation	Negative Medium	Negative Low	• Limit construction activities near (< 50m) wetlands to winter (as much as possible) when rain is least likely to wash concrete and sand into the wetland. Activities in black turf soils can become messy during the height of the rainy season and construction activities should be minimised during these times to minimise unnecessary soil disturbances. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • No activities are permitted within the wetland and associated buffer areas. • Landscape and re-vegetate all unnecessarily denuded areas as soon as possible.
	Potential contamination of wetlands with machine oils and construction materials.	Negative Low	Negative Low	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately stockpile topsoil cleared from the project area. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands.

				• No activities are permitted within the wetland and associated buffer areas.
Visual Impact Assessment (Appendix E3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities to between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Soil and Agricultural Assessment (Appendix E4)	Loss of Land Capability	Negative Low	Negative Low	• Vegetate or cover all stockpiles after stripping/removing soils • Storage of potential contaminants should be undertaken in bunded areas • All contractors must have spill kits available and be trained in the correct use thereof.

				• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping". • No cleaning or servicing of vehicles, machines and equipment may be undertaken in water resources. • Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems.
Heritage Impact Assessment (Appendix E5)	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	• For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed. • Known sites should be clearly marked, so that they can be avoided during construction activities; • The contractors and workers should be notified that archaeological sites might be exposed during the construction activities; • Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible; • All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken; • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).

				• A person or entity, e.g. the ECO, should be tasked to take responsibility for the maintenance heritage sites. • In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures. • This option should be implemented when it is impossible to avoid impacting on an identified site or feature.
Palaeontological Impact Assessment (Appendix E6)	Disturbance, damage or destruction of legally protected fossil heritage within the development footprint during the construction phase	Negative Low	Negative Low	• The ECO for this project must be informed that the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) has a Very High Palaeontological Sensitivity. • If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance Find Protocol, attached, should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out. • Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).

Social Impact Assessment (Appendix E7)	Creation of direct and indirect employment opportunities.	Positive Low	Positive Medium	• A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Northam LM, Waterberg DM, Limpopo Province, South Africa, or elsewhere. • Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. • As with the labour force, suppliers should also as far as possible be sourced locally. • As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
	Economic multiplier effects from the use of local goods and services.	Positive Low	Positive Medium	• It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. • Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.

	Potential loss in productive farmland	Negative Medium	Negative Low	• The proposed site for the Vanadium SPP needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. • Livestock grazing on the proposed site need to be relocated. • All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO). • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.
	In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure.	Negative Medium	Negative Low	• Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers (from Welkom, Northam and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site. • Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Compile and implement a grievance mechanism. • Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour. • Prevent the recruitment of workers at the site.

				• Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process. • Establish clear rules and regulations for access to the proposed site. • Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase. • Establish procedures for the control and removal of loiterers from the construction site.
	Temporary increase in safety and security concerns associated with the influx of people	Negative Medium	Negative Low	• Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Provide transportation for workers to prevent loitering within or near the project site outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period. • The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. • Access in and out of the construction site should be strictly controlled by a security company appointed to the project. • A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.

				• The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. • The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	Impacts on daily living and movement patterns	Negative Medium	Negative Medium	• All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. • Heavy vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs and control measures along the R730, R30 and gravel road to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work). • The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.

				• The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impact (noise and dust)	Negative Medium	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. • The use of cooking or heating implements should only be used in designated areas.

				• Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.
	Impacts on the sense of place	Negative Low	Negative Low	• Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. • Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the site.

Traffic Impact Assessment (Appendix E8)	Construction and maintenance of gravel roads in vicinity of the site:	Negative Low	Negative Low	• Maintenance to lower order roads can be incorporated into the schedule, especially the maintenance of the road accessing the site. The site access road would require construction at the start of the construction project to safely transport the sensitive cargo through the site. A gravel roads maintenance programme for the gravel roads on site is recommended.
	Increased traffic on haulage routes:	Negative Low	Negative Low	• The impact of the increased traffic on regional routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic.
	Increased traffic on local routes:	Negative Low	Negative Low	• The impact of the increased traffic on local routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic.

6.2.2 Impacts during the operational phase

During the operational phase the site will serve as a solar plant. The potential impacts will take place over a period of 20 – 25 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*
- Activity 10 (b)(hh) (GN.R 324): *"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) in the Limpopo (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 20-year period. Table 6.4 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

Table 6.4: Impacts and the mitigation measures during the operational phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity, Animal and Plant Species Assessment (Appendix E1)	Continued fragmentation and degradation of natural habitats and ecosystems.	Negative Medium	Negative Low	• Refer to Construction Phase mitigation.
	Continuing spread of IAP and weed species.	Negative Medium	Negative Low	
	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).	Negative Medium	Negative Low	
Avifaunal Assessment (Appendix E2)	Collisions with infrastructure associated with the PV Facility	Negative High	Negative Medium	• The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines.

				• Non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun et al, 2021). This is especially pertinent to waders and aquatic species that may recognise the panel array as water bodies (lake effect as described above) and collide with the panels, causing mortality. • Overhead cables/lines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites. • Fencing mitigations: • Top 2 strands must be smooth wire; • Routinely retention loose wires; • Minimum distance between wires is 300 mm; and • Place markers on fences.
	Electrocution due to infrastructure associated with the PV Facility	Negative High	Negative Low	• The design of the proposed solar plant and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. • Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators

				and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered. • Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts (Prinsen et al, 2012).
	Direct mortality from persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	• All personnel should undergo environmental awareness training that includes educating on not poaching/persecuting avifauna species and collecting eggs.
	Direct mortality by roadkill during maintenance procedures	Negative Medium	Negative Low	• All personnel should undergo environmental induction with regards to awareness about speed limits and roadkill. • All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
	Encroachment of Invasive Alien Plants into disturbed areas	Negative Very High	Negative Low	• An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation. • Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project. • All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

				•
Wetland Impact Assessment (Appendix E9)	Traffic	Negative Medium	Negative Low	• Refer to Construction Phase mitigation.
	Overland flow contamination	Negative Medium	Negative Low	
	Increased anthropogenic activities in wetland	Negative Medium	Negative Low	
	Loss of sub-surface flows	Negative Medium	Negative Low	
Visual Impact Assessment (Appendix E3)	Visual impact on observers travelling along the roads and residents at homesteads within a 1km radius of the SPP.	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impact on observers travelling along the roads and residents at homesteads within a 1-5km radius of the SPP.	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.

	Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.			Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impacts of lighting at night on visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	• Shield the source of light by physical barriers (walls, vegetation etc.) • Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. • Make use of minimum lumen or wattage in fixtures. • Make use of down-lighters, or shield fixtures. • Make use of low-pressure sodium lighting or other types of low impact lighting. • Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
	Glint and glare on sensitive visual receptors in close proximity to the proposed facility.	Negative Low	N/A	• No mitigation measures applicable
	Visual impact of sensitive visual receptors of the proposed power line.	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude.

				Operations • Maintain the general appearance of the servitude as a whole.
	Visual impact and impacts on sense of place	Negative Medium	Negative Low	• The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area. • Implement good housekeeping measures
Soil and Agricultural Assessment (Appendix E4)	Loss of Land Capability	Negative Low	Negative Low	• Continuously monitor erosion on site • Monitor compaction on site
Heritage Impact Assessment (Appendix E5)	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	• Refer to construction phase mitigation.
Social Impact Assessment (Appendix E7)	Creation of employment opportunities and skills development	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.

	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• No mitigation measures are proposed
	Loss of agricultural land and overall productivity	Negative Medium	Negative Low	• The proposed mitigation measures for the construction phase should have been implemented at this stage. • Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.
	Contribution to LED and social upliftment	Positive Medium	Positive High	• A Community Needs Analysis (CNA) must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. • Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. • The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).
	Potential impacts related to the impact on tourism.	Low Positive	Low Positive	• Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a "Green Energy" awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. This could be

				implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which should be open to school fieldtrips, the local community, and tourists.
	Visual impact and impacts on sense of place	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed Vanadium SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.

6.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. Table 6.5 provides a summary of the impacts during the decommissioning phase. The decommissioning phase will however potentially result in impact on soils, pressure on existing service infrastructure, surface water and the loss of permanent employment. Skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.

Table 6.5: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment (Appendix E1)	Improvement of habitat through revegetation / succession over time	Positive Low	Positive Medium	• Plant vegetation species for rehabilitation that will effectively bind the loose material, and which can absorb run-off from the mining areas. • Rehabilitate all the land where infrastructure has been demolished. • Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. • Protect rehabilitation areas until the area is self-sustaining. • Diversion trenches and storm water measures must be maintained • Water management facilities must stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The mining areas must be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities must continue till closure of the mine is approved. • Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. • Refer to mitigation measures for the construction phase needed during the closure phase that are relevant.

Avifauna Impact Assessment (Appendix E2)	Displacement of priority avian species from important habitats	Negative Low	Negative Low	• None required due to low significance
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	• None required due to low significance
Wetland Impact Assessment (Appendix E9)	Removal of structures, machinery and equipment	Negative Low	Negative Low	• Refer to construction phase mitigation measures
	Rehabilitation of site to agreed land use	Negative Low	Negative Low	
Social Impact Assessment (Appendix E7)	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.

7 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the requirements of Section 2 of the NEMA to consider cumulative impacts as part of any environmental assessment process.

7.1 Introduction

The EIA Regulations (2017) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact – refer to Appendix E. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the project area that can be attributed to the project and other existing and planned future projects.

7.2 Geographic Area of Evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 7.1 below.

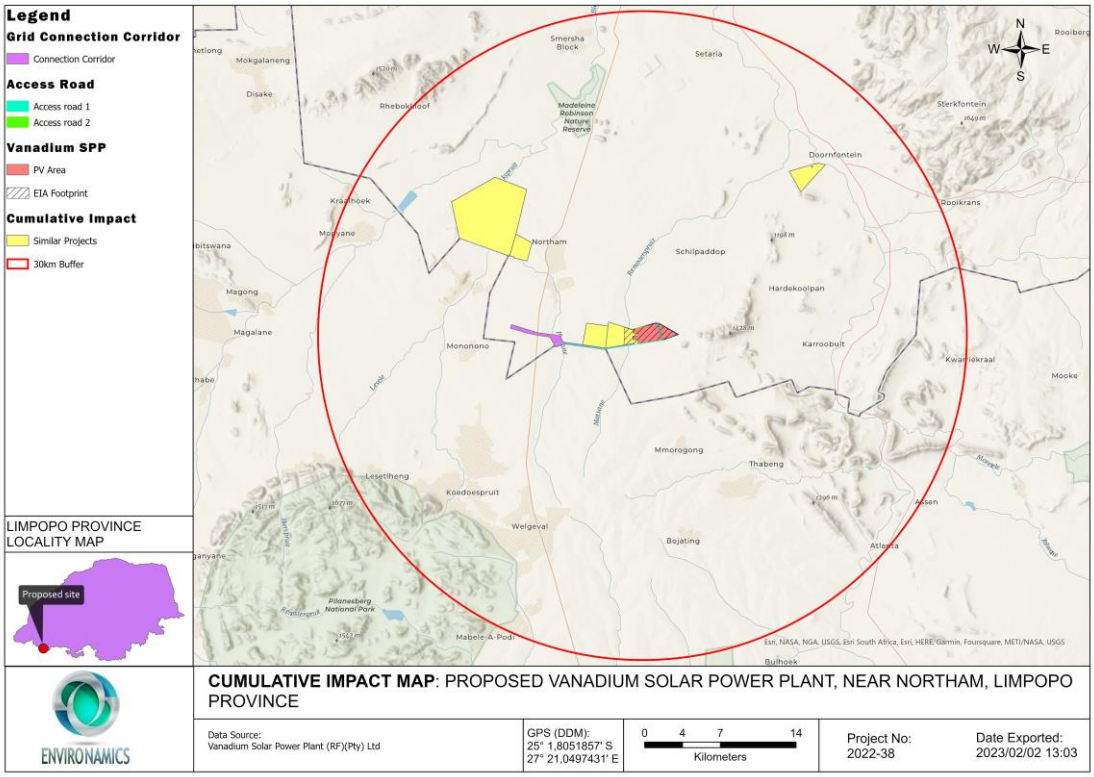


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Limpopo Provinces. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2024 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

7.4 OTHER PROJECTS IN THE AREA

7.4.1 Existing projects in the area

According to the DFFE's database, 10 solar PV plant applications have been submitted to the Department within the geographic area of investigation - refer to Table 7.1.

Table 7.1: A summary of related projects that may have a cumulative impact, in a 30 km radius of the study area

Site	Distance from Study Area	Proposed generating capacity	DEFF Reference	EIA Process	Project status
Portion 10 of the farm Wildebeestlaagte 411 KQ	13km	40 MW	12/12/20/2129	Scoping and EIA	Approved
Portion 5 of the farm Grootkuil 409 KQ	15km	30 MW	12/12/20/2526	Scoping and EIA	In process
Farm Liverpool 543 KQ Portion 2	20km	10 MW	14/12/16/3/1/969	BAR	Approved
Farm Liverpool 543 KQ Portion 2	20km	10 MW	14/12/16/3/3/1/969	BAR	Approved
Spitskop Solar Park	13km	0 MW	14/12/16/3/3/2/702	Scoping and EIA	In process

It is unclear whether other projects not related to renewable energy is or has been or will be constructed in this area. In general, development activity in the area is focused on industrial development, mining and agriculture. Agriculture in the area is primarily associated with cattle grazing. The next section of this report will aim to evaluate the potential for solar projects for this area in the foreseeable future.

As part of the SEA for Wind and Solar Energy in South Africa, the CSIR and the DFFE mapped the location of all EIA applications submitted within South Africa. According to this database approximately 3 applications have been submitted for renewable energy projects within the geographical area of investigation. The majority of these projects are located in close proximity to Northam.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area – refer to Figure 7.2 for process flow. The following sections present their findings.. The following sections present their findings.

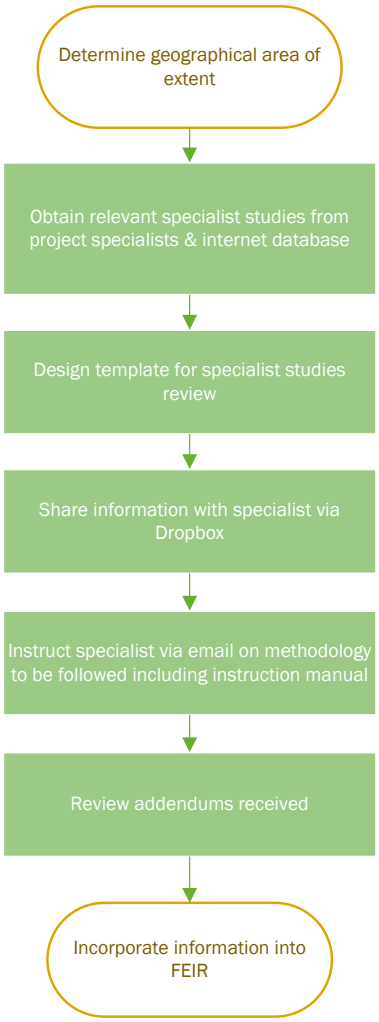


Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Soil, Land Capability and Agricultural Potential

According to the Agriculture Compliance Statement (Appendix E4), the cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact. But it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

What level of loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

Department of Forestry, Fisheries and the Environment (DFFE) requires compliance with a specified methodology for the assessment of cumulative impacts. This is positive in that it ensures engagement with the important issue of cumulative impacts. However, the required compliance has some limitations and can, in the opinion of this author, result in an over-focus on methodological compliance, while missing the more important task of effectively answering the above defining question.

All of these projects have the same agricultural impacts in a similar agricultural environment, and therefore the same mitigation measures apply to all.

As previously indicated, the proposed development poses a low risk in terms of causing soil degradation because it can be fairly easily and effectively prevented by standard best practice soil degradation control measures, as recommended and included in the EMPr of the EIA Report. If the risk for each individual development is low, then the cumulative risk is also low.

Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved.

7.5.2 Ecology

The Terrestrial Biodiversity Impact Assessment (refer to Appendix E1) confirmed that cumulative impacts, from an ecological point of view, are those that will impact the natural faunal and floristic communities and habitats surrounding the proposed solar development, mainly by other similar developments and their associated infrastructure in its direct vicinity. As more and more similar developments occur in the direct vicinity of the currently proposed development, habitat losses and fragmentation will occur more frequently and populations of threatened, protected or other habitat specific species (both faunal and floral) will be put under increasing pressure through competition for suitable habitat. Fragmentation of habitats prevent the natural flow of ecosystem services and may have a detrimental effect on the gene pool of a species, which may lead to the loss of a population of such a species on fragmented portions. Through a development, such as the one proposed for the study area, natural habitat is totally transformed and although some vegetation cover generally returns to these areas, microhabitats are totally destroyed and the area will probably never again be able to function without some human maintenance and management.

The cumulative impact of the solar project in the project area should all the projects be approved and developed are as follows:

- The cumulative impact on the natural ecosystems (fauna and flora) would be moderate considering that large sections of the area for development has already been degraded through agricultural activities (crop cultivation, overgrazing etc.).

- The moderate cumulative impacts are however dependant on the strict implementation of mitigation measures and monitoring during the construction, operational and decommissioning phases of the solar developments.

7.5.3 Avifauna

The Avifauna Impact Assessment (refer to Appendix E2) states It is the cumulative impacts, when considering the existing transformation of the threatened habitats to croplands and mining, in addition to the prevalence of planned solar developments, that increase the cumulative risks and, therefore, warrant mitigations.

Mitigating the cumulative impacts would require limiting the impact of Vanadium SPP to an absolute minimum, which is not necessarily feasible but should be pursued. The mitigations to reduce cumulative impacts involve limiting the disturbance footprint (overall size), limiting human activity and noise throughout the project life, disturbing as little natural vegetation as possible, retaining the natural vegetation beneath the panels and around infrastructure, limiting the extent and width of roadways, reducing the speeds that vehicles travel, and then thoroughly rehabilitating the entire footprint back to natural grassland after decommissioning.

Despite some residual and cumulative impacts, there is no objection, from an avifaunal perspective to the development of the proposed SPP development.

7.5.4 Social Impact Assessment

The Social Impact Assessment (refer to Appendix E7) indicate that from a social impact point of view the project represents an important development opportunity for the communities surrounding Vanadium SPP. Should it be approved, it will not only supply the national grid with much needed clean power but will also provide a number of opportunities for social upliftment. The cumulative impacts for each of the potential social impacts were assessed throughout the report. The most significant cumulative social impacts are both positive and negative: the community will have an opportunity to better their social and economic well-being, since they will have the opportunity to upgrade and improve skills levels in the area, but impacts on family and community relations may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

7.5.5 Visual

The Visual Impact Assessment (refer to Appendix E3) confirmed that the construction and operation of the PV facility may increase the cumulative visual impact together with farming activities, dust on gravel roads, existing Eskom power line infrastructure and new projects, mines in the area and other proposed solar power facilities in the area. The significance of the visual impacts can only be determined once projects have been awarded preferred bidder status. However, taking into account the already disturbed visual surrounds due to extensive mining activities in the area and all the positive factors of such a development including economic factors, social factors and sustainability factors, the visual impact of this proposed

development will be insignificant and is suggested that the development commence, from a visual impact point of view.

7.5.6 Heritage

The Heritage Impact Assessment (Refer to Appendix E5) concluded that from a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Vanadium SPP is located in an area with a very low presence of heritage sites and features.

The cultural heritage profile of the larger region is very low. Most frequently found are farmsteads, formal and informal burial sites. For this review, heritage sites located in urban areas have been excluded.

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources around the proposed for development and the generally low density of sites in the wider landscape the overall cumulative impacts to heritage are expected to be of generally low significance before mitigation.

For the project area, the impacts to heritage sites are expected to be of low to negligible significance.

7.5.7 Paleontology

According to the Palaeontological Impact Assessment (refer to Appendix E6), based on the SAHRIS website, the only palaeontological heritage assessments (PIAs) available for this region (Almond 2015, Brink undated, Groenewald 2013b, Millsteed 2013b) are all at desktop level with no field data. The cumulative Impacts of the area will include approved electrical facilities within a 30 km radius of the project site. As the mentioned MTS and Powerlines and corridors are all underlain by similar geology the Impact on these developments will be similar. The Palaeontological Significance of the proposed Vanadium SPP is rated as Low and the cumulative Impacts will thus also be Low Negative.

7.5.8 Traffic

According to the Traffic Impact Assessment (refer to Appendix E8) depending on the timing of the other nearby renewable energy projects, where construction could overlap, traffic impact will increase accordingly. It should be noted that the volume of traffic is related to the specific development stage, logistics planning and development size.

The construction period for other renewable energy projects is relatively short (between 12 and 18 months), where traffic flow will vary during the construction period. It is assumed that 50% of these projects' construction periods would likely coincide with the Vanadium SPP construction period. This additional traffic, however, will be widely dispersed and easily accommodated on the surrounding road network. In addition, the traffic impact of the operational and maintenance periods will be low/ negligible, and it is also unlikely that the decommissioning of these projects will coincide with each other.

In conclusion, the cumulative impact and significance of the various nearby renewable energy projects is considered to have a low/ negligible impact and therefore no corrective measures will be required.

7.6 IMPACT ASSESSMENT

Following the definitions of the term, the "residual effects on the environment", i.e. effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also, a "combination of different individual environmental effects of the project acting on the same environmental component" can result in cumulative effects.

7.6.1 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented in Section 6 (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects discussed are summarized in Table 7.2. There have been specific VECs identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.2 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.2: Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial Biodiversity Assessment	Habitat destruction & Fragmentation	The construction phase of the development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- Medium
	Soil erosion and sedimentation	The construction activities associated with the development may result in widespread soil disturbance and is usually associated with accelerated soil erosion. Soil erosion promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora. The impact is considered as cumulative as it will influence the vegetation communities in the area.	- Low
	Dust pollution	The environmental impacts of wind-borne dust, gases and particulates from the construction activities associated with the proposed development are primarily related to human health and ecosystem damage. Poor air quality results in deterioration of visibility and aesthetic landscape quality of the	- Low

		region, particularly in winter due to atmospheric inversions. The impact is cumulative as dust pollution has an impact on the surrounding environment and as the surrounding area is already impacted by mining and agricultural activities.	
	Spillages of harmful substances	Construction work for the proposed development will always carry a risk of soil and water pollution, with large construction vehicles contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or ground water, leading to potential medium/long-term impacts on fauna and flora. During the construction phase heavy machinery and vehicles would be the main contributors to potential pollution problems. The impact is considered to be cumulative as the spillages of harmful substances can have indirect impacts to the surrounding environment.	- Low
	Spreading of alien invasive species	Continued movement of vehicles on and off the site during the construction phase will result in a risk of importation of alien species. Vehicles often transport many seeds, and some may be of invader species, which may become established along the access road, especially where the area is disturbed. The construction carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.	- Low
	Negative effect of human activities on fauna and flora and road mortalities on fauna	Continued movement of vehicles on and off the site during the construction phase will result in a risk of importation of alien species. Vehicles often transport many seeds, and some may be of invader species, which may become established along the access road, especially where the area is disturbed. The construction carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the	- Low

		development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	
Wetland Baseline and Risk Assessment	Impact on the characteristics of the watercourse	The construction activities associated with the proposed solar power plant will potentially have an impact on the wetland areas and water levels, whether it is through direct or indirect impacts. The clearance of vegetation for the solar power plant will either have a direct or indirect impact on the wetlands and smaller drainage channels. Loss of the riparian and instream habitat will also result in permanent loss or displacement of the invertebrates, birds and small mammals' dependant on the wetland vegetation for feeding, shelter and breeding purposes. All functions associated with the wetland zones and the surrounding landscape will be compromised if mitigation measures are not applied correctly. Other indirect impacts of the construction of the solar power plant on the characteristics of the water course include impacts on water quality and changes to the geomorphology should the development cause impacts on downstream areas. The impact is considered to be cumulative due to proposed development impacting on the characteristics of the watercourse.	- Medium
	Soil erosion and sedimentation	The use of heavy machinery during the construction and decommissioning phases of the development will result in the compaction of soil, resulting in decreased infiltration of rainwater and increased surface run-off volumes and velocities leading to a greater erosion risk. The hardened surfaces of the road and compacted soils of the proposed development area will also lead to an increase in surface run-off during storm events which will likely be discharged via stormwater outlet points, concentrating flows leaving the exposed areas. This can lead to erosion in the cleared areas and channel forming where culverts concentrate water on the side of the road where the river and riverine area are located. It can lead to sedimentation, in the river. The impact is considered to be cumulative due to proposed development contributing to the risk of sediment transport and erosion in the area.	- Low
	Soil and water pollution (Spillages of harmful substances)	Construction work will also carry a risk of soil and water pollution, with large construction vehicles contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the	- Low

		soil and surface- or groundwater, leading to potential medium/long-term impacts on fauna and flora. The impact is considered to be cumulative due to proposed development contributing to the risk of soil and water pollution in the area.	
	Spread and establishment of alien invasive species	The construction almost certainly carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. Continued movement of personnel and vehicles on and off the site, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project. Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Low
Avifaunal Impact Assessment	Displacement of priority avian species from important habitats	The proposed Vanadium Solar Power Plant in isolation has a Negative Low impact significance. In consideration of the aforementioned information, the cumulative impact was determined to be of a Negative High significance. It is important to note that this also accounts for the relative importance of the habitats within and adjacent to the project area, in the context of the value of the regional habitat. Considering the anthropogenic activities and influences within the 30 km radius, approximately 55% of natural habitat has been lost, and as discussed above, the proposed solar developments will result in a further loss of approximately 13.9%. It is also	- High

		important to consider that this projected habitat loss is only due to renewable energy developments, and further loss is a possibility with additional types of anthropogenic developments. Apart from habitat loss, one also needs to consider additional potential impacts such as light pollution, vibration, noise pollution and resource exploitation. This means that the careful spatial management and planning of the entire region must be a priority, and existing large infrastructure projects must be carefully monitored over the long term.	
Soil and Agricultural Assessment	Loss of agricultural land	The cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved. Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact is also assessed as negligible.	- Low
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For the purpose of this review, heritage sites located in urban areas have been excluded. Because of the low likelihood of finding further significant heritage resources in the relevant area proposed for development and the generally low density of sites in the wider landscape the cumulative impacts to the heritage are expected to be of low significance.	- Low
Palaeontological Impact Assessment	Disturbance, damage or destruction of legally-protected fossil heritage within the development footprints during the construction phase (impacts on well-preserved and / or rare	A low palaeontological significance has been allocated to the proposed development. It is therefore considered that the development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.	- Low

	fossils of scientific and conservation value)		
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Vanadium SPP and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Vanadium SPP alone.	+ Medium
	Impact with large-scale in-migration of people	While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.	- Medium

Traffic Impact Study	Increase in construction vehicles	The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e. the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.	- Low
Operational Phase			
Terrestrial Biodiversity Impact Assessment	Habitat destruction & Fragmentation	The development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- Medium
	Soil erosion and sedimentation	The development may result in widespread soil disturbance and is usually associated with accelerated soil erosion. Soil erosion promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora. The impact is considered as cumulative as it will influence the vegetation communities in the area.	- Low
	Dust pollution	The environmental impacts of wind-borne dust, gases and particulates from the operation and maintenance activities associated with the proposed development are primarily related to human health and ecosystem damage. Poor air quality results in deterioration of visibility and aesthetic landscape quality of the region, particularly in winter due to atmospheric inversions. The impact is considered to be cumulative as dust pollution has an impact on the surrounding environment and as the surrounding area is already impacted by mining and agricultural activities.	- Low
	Spillages of harmful substances	Maintenance work for the proposed development will always carry a risk of soil and water pollution. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or ground water, leading to potential medium/long-	- Low

		term impacts on fauna and flora. The impact is considered to be cumulative as the spillages of harmful substances can have indirect impacts to the surrounding environment.	
	Spreading of alien invasive species	Continued movement of vehicles on and off the site will result in a risk of importation of alien species. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. Movement of vehicles will however be reduced during operation and maintenance of the facility.	- Low
	Negative effect of human activities on fauna and flora and road mortalities on fauna	Continued movement of vehicles on and off the site will result in a risk of importation of alien species. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Low
Wetland/Riparian Assessment	Impact on the characteristics of the watercourse	The operation and maintenance activities associated with the proposed solar power plant will potentially have an impact on the wetland areas and water levels, whether it is through direct or indirect impacts. All functions associated with the wetland zones and the surrounding landscape will be compromised if mitigation measures are not applied correctly. Other indirect impacts o include impacts on water quality and changes to the geomorphology should the development cause impacts on downstream areas. The impact is considered to be cumulative due to proposed development impacting on the characteristics of the watercourse.	- Medium
	Soil erosion and sedimentation	The hardened surfaces of the road and compacted soils of the proposed development area will lead to an increase in surface run-off during storm events which will likely be discharged via stormwater outlet points, concentrating flows leaving the exposed areas. This can lead to erosion in the cleared areas and channel forming where culverts concentrate water on the side of the road where the river and riverine area are located. It can lead to sedimentation, in the river. The impact is considered to be cumulative due to proposed development contributing to the risk of sediment transport and erosion in the area.	- Low

	Soil and water pollution (Spillages of harmful substances)	Maintenance work will also carry a risk of soil and water pollution, with large construction vehicles (where used) contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface- or groundwater, leading to potential medium/long-term impacts on fauna and flora. The impact is considered to be cumulative due to proposed development contributing to the risk of soil and water pollution in the area.	- Low
	Spread and establishment of alien invasive species	Continued movement of personnel and vehicles on and off the site, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project. Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Low
Visual Impact Assessment	Visual intrusion of the development on observers within the area	The operation and maintenance of the facility will create visual instruction on observers that utilise and travel through the area, including travellers using the local roads	- Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium

7.7 CONCLUSION

This chapter of the Scoping Report addressed the cumulative environmental effects of the construction, operation and decommissioning project phases to be further assessed as part of the EIA Phase. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
  - Habitat destruction and fragmentation (- Medium)
  - Impact on the characteristics of the watercourse (- Medium)
  - Displacement of priority avian species from important habitats (- Medium)
  - Loss of important avian habitats (- Medium)
  - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
  - Impact with large-scale in-migration of people (- Medium)
- Cumulative effects during the operational phase:
  - Habitat destruction and fragmentation (- Medium)
  - Impacts on the characteristics of the watercourse (- Medium)
  - Visual intrusion (- Medium)
- Cumulative effects during the decommissioning phase:
  - Generation of waste (- Medium)

The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project are expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment.

Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Limpopo Province. No cumulative impacts with a high residual risk have been identified.

In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one (where the landscape has already experienced degradation), than to lose land with a higher environmental value elsewhere in the country.

8 PLAN OF STUDY FOR EIA

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include -

(i) a plan of study for undertaking the EIA process to be undertaken, including-

(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;

(ii) a description of the aspects to be assessed as part of the EIA process;

(iii) aspects to be assessed by specialists;

(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;

(v) a description of the proposed method of assessing duration and significance;

(vi) an indication of the stages at which the competent authority will be consulted;

(vii) particulars of the public participation process that will be conducted during the EIA process; and

(viii) a description of the tasks that will be undertaken as part of the EIA process;

(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

8.1 INTRODUCTION

This section gives a brief outline of the Plan of Study for EIA (PoSEIA) and the tasks that will be undertaken and the anticipated process to meet the objectives for the EIA phase. The approach to the EIA is to focus on those key issues identified for the preferred alternative. This will ensure that the EIA focuses on the most significant impacts and in the process save time and resources.

8.2 ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE

The purpose of the EIA phase is to assess issues identified in the scoping phase and will include an environmental management program (EMPr). The EMPr will provide information on the proposed activity and the manner in which potential impacts will be minimized or mitigated. The EIA report will comply with Appendix 3 and will:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the—
  - (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
  - (ii) degree to which these impacts-
    - (aa) can be reversed;
    - (bb) may cause irreplaceable loss of resources, and
    - (cc) can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

8.3 TASKS TO BE UNDERTAKEN

The following sections describe the tasks that will be undertaken as part of the EIA Phase of the process.

8.3.1 Project Description

Further technical and supporting information will be gathered to provide a more detailed project description. This will include a detailed and finalised site layout plan that will be compiled once the areas of sensitivity identified in this Scoping Report have been confirmed by the specialists.

8.3.2 Consideration of alternatives

The following project alternatives will be investigated in the EIR:

- Design/Layout alternatives: In terms of the actual layout of the proposed PV plant which will only be assessed for the preferred site alternative. A Final facility layout is included in Figure H.

8.3.3 Compilation of Environmental Impact Report (EIR)

A Final EIR will be compiled to meet the content requirements as per Appendix 3 of GNR. 326 of the EIA Regulations (as amended) and will also include a Final Environmental Management Programme containing the aspects contemplated in Appendix 4 of GNR326. The Generic EMPr for overhead electricity transmission and distribution infrastructure and the Generic EMPr for the

development of the associated substation infrastructure for transmission and distribution of electricity as per Government Notice 435, which were published in Government Gazette 42323 on 22 March 2019, will also be included in the Final EIR.

8.3.4 Public participation

All registered I&APs and relevant State Departments will be given the opportunity to review the Final Environmental Impact Report in accordance with Regulation R326. A minimum of 30 days commenting period will be allowed and all stakeholders and I&APs will be given an opportunity to forward their written comments within that period. All issues identified during this 30-day review and comment period will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR to be submitted to the DFFE for decision-making on the Application for Environmental Authorisation.

8.4 ASPECTS ASSESSED

Table 8.1 below provides a summary of the aspects that have been assessed. The aspects are also linked to specialist information obtained.

Table 8.1: Aspects assessed

Aspects	Potential impacts	Specialist studies / technical information
Construction of the PV Solar facility	• Impacts on the fauna and flora	Terrestrial Biodiversity Survey and Avifauna Impact Assessment
	• Wetlands and riparian areas	Wetland Impact Assessment
	• Impacts on agricultural potential (soils)	Soil and Agricultural Compliance Statement
	• Impacts associated with the geology of the site	Geotechnical Assessment
	• Impacts on existing services infrastructure	Confirmation from the Local Municipality
	• Temporary employment, impacts on health and safety	Social Impact Assessment
	• Impacts on heritage resources	Heritage Impact Assessment and Palaeontological Impact Assessment
Operation of the PV Solar facility	• Impacts on the fauna and flora	Terrestrial Biodiversity Survey and Avifauna Impact Assessment

	• Wetlands and riparian areas	Wetland Impact Assessment
	• Impacts on agricultural potential (soils)	Soil and Agricultural Compliance Statement
	• Impacts associated with the geology of the site	Geotechnical Assessment
	• Increased consumption of water	Confirmed volumes to be provided by the Applicant
	• Pressure on existing services infrastructure	Confirmation from the Local Municipality
	• Visual Impact	Visual Impact Assessment
	• Provision of employment and generation of income for the local community	Social Impact Assessment
Decommissioning of the PV Solar facility	• Impacts on the fauna and flora	Terrestrial Biodiversity Survey and Avifauna Impact Assessment
	• Socio-economic impacts (loss of employment)	Social Impact Assessment
Cumulative Impacts	• Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity.	All independent specialist studies results to be considered and analised by the EAP

8.4.1 Specialist studies

Based on the initial descriptions of potential environmental impacts or aspects (refer to Table 6.2), specialists have been subcontracted to assess the potential impacts that may be significant. The specialist studies assess impacts on both the social and the biophysical environment and also help in identifying ways that can help to mitigate the envisaged impacts. The following specialist studies have been included to address the potentially most significant impact as identified during the scoping phase – refer to Table 6.2:

- Geotechnical report: To determine whether the geotechnical conditions at the site are favorable for the development and construction of a solar PV plant.
- Heritage Impact Assessment: To determine whether the proposed activity will impact on any heritage or archeological artifacts.
- Terrestrial Biodiversity Impact Assessment: To determine what the impact of the proposed activity will be on the ecology (fauna and flora) in the area.

- Wetland /Riparian Impact Assessment: To determine the impact of the proposed activity on the wetlands present on Portion 1 of the farm Makayskraal No. 18, Portion 2 of the farm Zwartdoorns No. 421, Registration Division JQ, Limpopo Province.
- Avifauna Impact Assessment: To determine what the impacts of the proposed activity will have on the birds (avifauna) in the area.
- Visual Impact Assessment: To determine to what extent the proposed activity will be visually intrusive to the surrounding communities or other receptors.
- Soil and Agricultural Compliance Statement: To determine how the proposed activity will impact on soil and agricultural resources.
- Social Impact Assessment: To determine how the proposed activity will impact on the socio-economic environment.
- Palaeontological Impact Assessment: To determine the impacts on palaeontological resources.
- Traffic Impact Assessment: To determine the impacts on road users on long haul routes and roads around the project area.

8.4.2 Terms of reference for specialist studies

Specialists in their field of expertise will consider baseline data and identify and assess impacts according to predefined rating scales (section 8.5). Specialists will also suggest optional or essential ways in which to mitigate negative impacts and enhance positive impacts. Further, specialists will, where possible, take into consideration the cumulative effects associated with this and other projects which are either developed or in the process of being developed in the local area. The specialist is reminded to follow the latest DFFE protocols.

The results of these specialist studies have been integrated into the Final Scoping Report. The general requirements proposed for the inputs are presented below and specialists are encouraged to comment and provide input on these.

General Requirements

Specialists' reports must comply with Appendix 6 of GNR. 326 published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and whereby the following are to be included:

- The details of-
    - the specialist who prepared the report; and
    - the expertise of that specialist to compile a specialist report including a curriculum vitae;
- A declaration that the specialist is independent in a form as may be specified by the competent authority;
- An indication of the scope of, and the purpose for which, the report was prepared;

- An indication of the quality and age of base data used for the specialist report;
- A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;

- The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
- A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
- Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
- An identification of any areas to be avoided, including buffers;
- A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;
- Any mitigation measures for inclusion in the EMPr;
- Any conditions for inclusion in the environmental authorisation;
- Any monitoring requirements for inclusion in the EMPr or environmental authorisation;
- A reasoned opinion-
  - whether the proposed activity, activities or portions thereof should be authorised;
    - regarding the acceptability of the proposed activity or activities; and
  - if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
- A description of any consultation process that was undertaken during the course of preparing the specialist report;
- A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- Any other information requested by the competent authority.

In addition to the above, specialists are expected to:

- Review the Scoping Report, with specific reference to the Comments and Response Report to familiarize with all relevant issues or concerns relevant to their field of expertise;
- In addition to the impacts listed in the Scoping Report, identify any issue or aspect that needs to be assessed and provide expert opinion on any issue in their field of expertise that they deem necessary in order to avoid potential detrimental impacts;
- Assess the degree and extent of all identified impacts (including cumulative impacts) that the preferred project activity and its proposed alternatives, including that of the no-go alternative, may have;
- Identify and list all legislation and permit requirements that are relevant to the development proposal in context of the study;
- Reference all sources of information and literature consulted; and
- Include an executive summary to the report.

8.5 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 8.2.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

8.5.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving

environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact the following criteria is used:

Table 8.2: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		

1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

8.6 CONSULTATION WITH THE COMPETENT AUTHORITY

Consultation with the competent and commenting authorities will continue throughout the duration of impact assessment phase. The authorities will also comment on whether they deem it necessary to conduct additional specialist studies other than what is proposed already in this PoSEIA. On-going consultation will include:

- Submission of the Final EIR following a 30-day public review period (and consideration of comments received).
- Arrangements will be made to discuss the report with the Environmental Officer responsible for the project during the review period, where required.

9 CONCLUSION

This Final Scoping Report is aimed at identifying the 'scope' of the EIA that will be conducted in respect of the activity for which authorization is being applied for. It can be concluded that:

- The scoping phase complied with the specifications set out in Regulations 21 and Appendix 2 of GNR326.
- All key consultees have been consulted as required by the Regulations 39 to 44.

Based on the contents of the report the following key environmental issues were identified which need to be addressed in the EIA report:

- Impacts during construction phase:
  - Direct habitat destruction (- Medium)
  - Habitat Fragmentation (- Medium)
  - Impact on the characteristics of the watercourse (- Medium)
  - Creation of direct and indirect employment opportunities (+ Medium)
  - Economic multiplier effects from the use of local goods and services (+ Medium)
  - Impacts on daily living patterns (- Medium)
- Impacts during the operational phase:
  - Habitat destruction and fragmentation (- Medium)
  - Displacement of priority avian species from important habitats (- Medium)
  - Impact on the characteristics of the watercourse (- Medium)
  - Creation of employment opportunities and skills development. (+ Medium)
  - Development of non-polluting, renewable energy infrastructure. (+ Medium)
  - Contribution to LED and social upliftment (+ High)
- Impacts during the decommissioning phase:
  - Improvement of habitat through revegetation / succession over time (+ Medium)
- Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.

No fatal flaws or impacts of a high significance has been identified to be associated with the proposed development. The issues identified will be addressed in more detail in the EIA report as part of the EIA Phase.

Considering the environmental sensitive features present within the development footprint, as identified in this Scoping Report, the Applicant has proposed a Final facility layout which considers these features, and thereby aim to avoid any direct impact on these features. The Final layout will be further assessed and optimised as part of the EIA Phase of the project to ensure that the development footprint within the affected property is appropriate from an environmental perspective, and thereby avoids the present sensitive environmental features and areas as identified by the independent specialists.

The EAP therefore recommends that:

The scoping report be approved after which the EIA process, as required by Regulations 23 to 24 may commence.

We trust that the Department of Forestry, Fisheries and the Environment find the report in order and we eagerly await your comments in this regard.

Mr. Herman Alberts
Environamics Environmental Consultants

ENVIRONAMICS

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