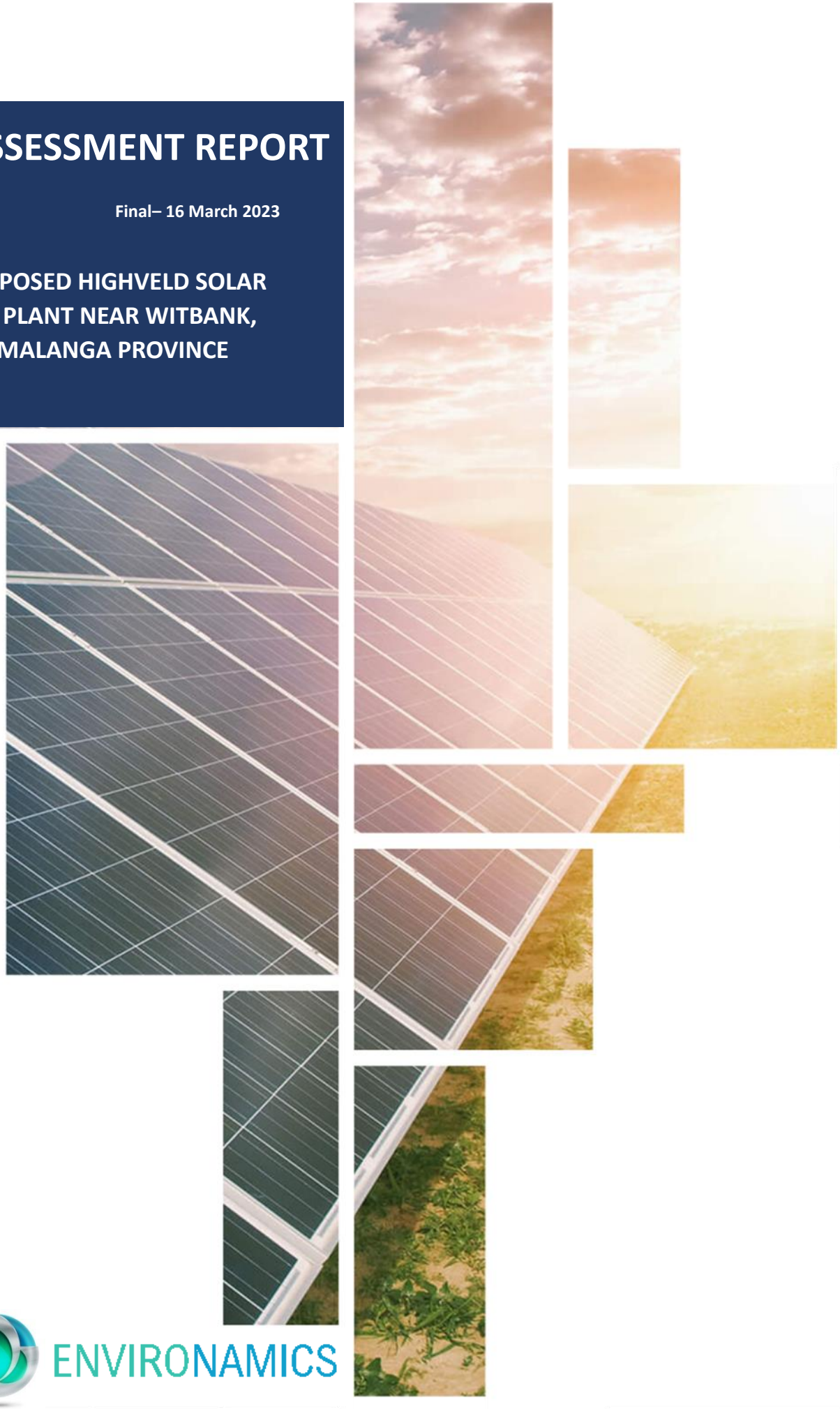
BASIC ASSESSMENT REPORT

Final– 16 March 2023

THE PROPOSED HIGHVELD SOLAR POWER PLANT NEAR WITBANK, MPUMALANGA PROVINCE



ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	**:**	14/12/16/3/3/1/2691
Project Title	**:**	The proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.
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Reviewer	:	Mrs. Carli van Niekerk
Client	**:**	Highveld Solar Power Plant (RF) (Pty) Ltd
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GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
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
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
PPP	Public Participation Process
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
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, 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. 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 (2019 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 1000MW 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 DMREs Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programs/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, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emissions by 2050 and to increase its renewable capacity.

In response to the above, Highveld 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 various properties including Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279, Registration Division JS, Mpumalanga Province (refer to Figure A for the locality map). The project entails the generation of up to 300MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 469 hectares (including supporting infrastructure on site, however excluding the overhead power line) within the 673 hectares identified and assessed as part of the Basic Assessment process, which is located within the five affected properties. From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2068 kwh/m^2. The region is also preferred based on its inclusion within the Emalahleni Renewable Energy Development Zone (REDZ).

EXECUTIVE SUMMARY

Like many other developing municipalities in the country, the eMalahleni Local Municipality, within which the Highveld Solar Power Plant is proposed, faces a number of challenges in addressing the needs and improving the lives of the community. The Integrated Development Plan (2021-2022) of the Nkangala District Municipality[1] states that it is the vision of the municipality to enhancing environmental sustainability and protecting natural resources; spatial transformation and sustainable human settlements; promoting vibrant rural communities, an inclusive rural economy and food security; inclusive economic growth and decent employment for a skilled workforce; functional efficient infrastructure network to facilitate growth; improving education, training and innovation; promoting health care for all; providing social protection to be vulnerable; building safer caring communities; building a capable, financially sustainable and developmental governance system and promoting nation building and social cohesion through participative planning. The eMalahleni Local Municipality's Integrated Development Plan (2017-2022) vision is to be a centre of excellence and innovation. eMalahleni can be seen as the energy heartbeat of Southern Africa and economic hub of Mpumalanga. Empowerment of communities and providing innovative and excellent service that is conducive for sustainable economic development and social transformation, is the mission of the eMalahleni Local Municipality. The development of the Highveld Solar Power Plant will contribute to the realisation of the vision and mission of the respective local and district municipalities that will be affected by the proposed development.

Highveld Solar Power Plant (RF) (Pty) Ltd intends to develop a photovoltaic solar facility and associated infrastructure on various properties Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279, Registration Division JS, Mpumalanga Province situated within the eMalahleni Local Municipality and the greater Nkangala District Municipality. The solar facility will have a generating capacity of up to 300MW. The town of Witbank is located approximately 15 km south east of the proposed development (refer to Figure A and Figure B for the respective locality and regional maps). The total development footprint of the project will approximately be 469 hectares (including supporting infrastructure on site, however excluding the overhead power line) within the 673 hectares identified and assessed as part of the Basic Assessment process, which is located within the five affected properties. The project footprint have been reduced from 500 hectares to 469 hectares to ensure avoidance of high sensitivity areas on the project site. The site[2] 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 into the national grid), 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). Grid connection infrastructure is also being proposed and assessed within this report. The grid connection infrastructure includes a 132kV power line to connect the facility from a 130 MVA (High Voltage - 132kV and Medium Voltage – 33kV) substation to the national grid. Generation from the facility will link to

[1] The eMalahleni Local Municipality falls within the Nkangala District Municipality.

[2] The site is defined as Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279. The full extent of the site has been assessed as part of this BA process for the development by the EAP and the independent specialists.

the Eskom Vulcan 400kV MTS Substation. The connection have been assessed within the 250m wide (up to 690m in some instances) pre-negotiated grid connection corridor. Connection will be limited to the grid connection corridor.

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 Highveld Solar Power Plant. The following listed activities have been identified with special reference to the proposed development and is listed in the EIA Regulations (as amended):

- Activity 11(i) (GNR 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 12(ii)(a)(b) (GNR 327): *"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 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 (GNR 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 cubic meters 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 (f)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) in the Mpumalanga province, (i) outside urban areas and within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans*".
- Activity 10 (f)(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 Mpumalanga Province (i) outside urban areas and 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 edge of a watercourse or wetland."

- Activity 12 (f)(ii)(iii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation…(f) in the Mpumalanga Province (ii) 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 Spatial Biodiversity Assessment 2004 and (iii) within critical biodiversity areas identified in bioregional plans."*

- Activity 14(ii)(a)(c)(f)(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) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; in the (f) Mpumalanga 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."*

- Activity 18 (f)(i)(ee) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (f) in the Mpumalanga (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.."*

Activities required for the development of the solar facility which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 & 324) implies that the development could potentially have an impact on the environment that will require mitigation. The proposed Highveld Solar Power Plant (SPP) is located within a Renewable Energy Development Zone (REDZ) and subsequently a Basic Assessment process is required to be followed as described in Regulations 19 and 20 of the EIA Regulations (as amended). Environamics has been appointed as the independent Environmental Assessment Practitioner to undertake the Basic Assessment (BA) on behalf of Highveld Solar Power Plant (RF) (Pty) Ltd.

Regulation 19 of the EIA Regulations (2017) requires that a Basic Assessment Report (BAR) must contain the information set out in Appendix 1 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 1 of GNR326 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the BAR. It has been determined through the BA 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 are briefly summarized below.

Impacts during the construction phase:

Construction of the solar power plant will potentially result in the following impacts: habitat destruction and fragmentation, impacts to wetland features, soil, air and water pollution, increased soil erosion and sedimentation, spread and establishment of alien invasive species, impact on priority and resident avifauna, loss of avian habitats, impact on heritage objects, impact on fossil heritage, potential loss of grazing farmland, visual impact on observers in-migration or influx of job seekers, presence of construction workers on the local communities, increased risk of veld fires, impacts on daily living and movement patterns and generation of waste. Socio-economic impacts such as the creation of local employment and business opportunities, skills development and training and technical support to local farmers and municipalities will be positive impacts emanating from the construction.

Impacts during the operational phase:

During the operational phase, the site will serve as a solar power plant and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with impacts on the fauna and flora, soils and water pollution, spread and establishment of alien invasive species, displacement of priority and resident avifauna, collisions of avifauna with PV array and power lines, avifauna electrocution when perched on power line infrastructure, visual impacts and dangerous goods hazards as part of battery storage facility (catching fire, exploding or leaking dangerous pollutants). The provision of sustainable service delivery from the local municipality also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community. Additional electricity will also be generated from a clean renewable resource.

Impacts during the decommissioning phase:

The physical environment will benefit from the closure of the solar power plant since the site will be rehabilitated to an acceptable state. The decommissioning phase will however potentially result in impact on the fauna and flora, dust impacts, pressure on existing service infrastructure 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.

Cumulative impacts:

According to this database approximately two (2) applications have been submitted for renewable energy projects within the geographical area of investigation. The potentially most significant cumulative impacts during the construction phase relate to the impacts to fauna, flora and wetland features, displacement of priority avifauna, loss of important avian habitats, loss of fossils, and the impact with large scale in-migration of people. The potential cumulative effects during the operational phase relate to collision of avifauna with power line infrastructure, electrocution of avifauna when perched on power line infrastructure and visual impacts. During the decommissioning phase, the generation of waste may result in cumulative impacts. These are further discussed in the BAR.

In accordance with the EIA Regulations, this Final BAR evaluates and rates each identified potential impact and identifies and recommends mitigation measures which will be required in order to ensure the reduction of the impact significance of negative impacts to acceptable levels and the avoidance of negative residual risks. This Final BAR also contains information that is required by the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) to consider the Application for Environmental Authorisation and to reach a decision contemplated in Regulation 20 of GNR 326. No fatal flaws or impacts with unacceptable levels of significance were identified and the impacts from

the proposed development are expected to be at an acceptable level with the implementation of mitigation measures and therefore the project can be authorised subject to the implementation of the recommended mitigation measures.

1 INTRODUCTION

This section aims to introduce the Basic Assessment Report (BAR) and specifically to address the following requirements of the regulations:

Appendix 1. (3) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and 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 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 EIA Regulations No. 324, 325, and 327 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 11(i)	• *"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 as 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 (132 kV), an on-site HV/MV substation (130 MVA, High Voltage:88/132kV, Medium Voltage: 33kV) and switching station. It is expected that generation from the facility will tie in with the existing Eskom Vulcan 400kV MTS Substation. The connection power line will be constructed within the limits of the pre-negotiated grid connection

		corridor assessed within the 250m wide (up to 690m in some instances) grid connection corridor.
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 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 such as diesel in containers with combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres. The dangerous goods will be stored in a bunded area within the construction site during the construction phase. During the operational phase the dangerous goods will be stored in a bunded area within the operations and maintenance areas. The dangerous goods to be stored on site relates to diesel/petrol and oil.
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 meters from a watercourse."* • Activity 19 is triggered as the 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 roads will vary between 4 and 12 meters in width. The internal roads will be up to 6m in width, the perimeter road will be up to 8m in width and the access road will be up to 12 m 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 properties have been used for grazing and the properties will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 469 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 as the existing access to the affected properties does not have a reserve and will need to be widened by more than 6 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 300 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 Rand Highveld Grasslands (Gm11) and majority of the grid connection corridor falls within the Eastern Highveld Grasslands (Gm12) which is described by Mucina and

		Rutherford (2006) as 'endangered'. Activity 15 is triggered since portions of the site have 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 469 hectares.
GNR. 324 (as amended in 2017)	Activity 4 (f)(i)(ee)	• *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) in the Mpumalanga province, (i) outside urban areas and within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans*". • Activity 4(f)(i)(ee) is triggered since the roads will not have a reserve and will vary between 4 and 12 meters in width. The internal roads will be up to 6m in width, the perimeter road will be up to 8m in width and the access road will be up to 12 m in width. The project is located within the Mpumalanga Province and falls outside of an urban area but a portion of the PV development footprint and grid connection corridor falls within CBA 2 as identified in the Mpumalanga 2015 Biodiversity Plan.
GNR. 324 (as amended in 2017)	Activity 10 (f)(i)(ee)(hh)	• *"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 (f) in the Mpumalanga Province (i) outside urban areas and 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 edge of a watercourse or wetland."* • Activity 10(f)(i)(ee)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel) in containers with a combined capacity of 80 cubic metres. The dangerous goods will be stored in a bunded area within the construction site during the construction phase. During the operational phase the dangerous goods will be stored in a bunded area within the operations and maintenance areas. The dangerous goods to be stored on site relates to diesel/petrol and oil.

		The project is located within the Mpumalanga Province and falls outside of an urban area, but a portion of the PV development footprint and a portion of the grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2015 Bioregional Plan. Furthermore, nine wetland features were identified within the 100 meters of the proposed development which includes channelled valley bottoms, unchanneled valley bottoms and hillslope seep wetlands.
GNR. 324 (as amended in 2017)	Activity 12 (f)(ii)(iii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation…(f) in the Mpumalanga (ii) 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 Spatial Biodiversity Assessment 2004 and (iii) within critical biodiversity areas identified in bioregional plans."* • Activity 12(f)(ii)(iii) is triggered since the proposed development is located in the Mpumalanga province and the vegetation on site is classified as being 'endangered'. Portions of the site have not been lawfully disturbed during the preceding ten years. A portion of the PV development footprint and grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2019 Biodiversity Plan.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(f)(i)(ff)	• *"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 (f) Mpumalanga 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."* • Activity 14(ii)(a)(c)(f)(i)(ff) is triggered as the 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 proposed development is located in the Mpumalanga province, outside of an urban area. A portion of the PV

		development footprint falls within CBA 2 and ESA 2, and the grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2015 Bioregional Plan.
GNR. 324 (as amended in 2017)	Activity 18 (f)(i)(ee)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (f) in the Mpumalanga (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* • Activity 18 (b)(i)(ee) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The proposed development is located in the Mpumalanga province, outside of an urban area. A portion of the PV development footprint and grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2015 Bioregional Plan.

The activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 & 324) for the project implies that the development is considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. Based on the location of the entire extent of the project within the eMalahleni REDZ (see Figure D), the process to be followed will be as per GNR 114, as gazetted on 16 February 2018. Therefore, the Highveld Solar Power Plant is subject to a Basic Assessment process and not a full EIA process, as well as a shortened timeframe for the processing of the Application for Environmental Authorisation by the Department of Forestry, Fisheries and the Environment (DFFE). The Basic Assessment must be undertaken in line with the requirements stipulated under Regulations 19 – 20 of the EIA Regulations. According to Appendix 1 of Regulation 326, the objective of the basic assessment process is to, through a consultative process:

- 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;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine —
    - The nature, significance, consequence, extent, duration and probability of the impacts occurring; and
    - degree to which these impacts-

- can be reversed;
- may cause irreplaceable loss of resources, and
- can be avoided, managed or mitigated; and

- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –
  - Identify and motivate a preferred site, activity and technology alternative;
  - Identify suitable measures to avoid, manage or mitigate identified impacts; and
  - Identify residual risks that need to be managed and monitored.

The draft Basic Assessment Report (BAR) was submitted to the Department of Forestry, Fisheries and the Environment (DFFE) for review and comment. According to GNR 326 all registered interested and affected parties (I&APs) and relevant State Departments (including Organs of State) must be allowed the opportunity to review and provide comment on the report. The draft BAR was made available to registered I&APs and all relevant State Departments for a 30-day review and comment period from 06 January 2023 to 06 February 2023. They were requested to provide written comments on the BAR within 30 days of receiving it. All issues identified during the review period have been documented and compiled into a Comments and Response Report (Appendix C6) submitted as part of the Final BAR to DFFE for decision-making.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person:	Lisa de Lange (Opperman)
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Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	084 920 3111 (Cell)
Electronic Mail:	lisa@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the BA. 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 BA is also summarized in the curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information of the independent specialists that have been appointed as part of the Basic Assessment process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced 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), which must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix D9 to this report. The expertise of the specialists is also summarized in their respective curriculum vitae's.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Avifaunal Impact Assessment	The Biodiversity Company	Mahomed Desai / Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Terrestrial Biodiversity, and Wetland Impact Assessments	The Biodiversity Company	Marnus Erasmus / Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	elizebutler002@gmail.com
Soil and Agricultural Assessment	The Biodiversity Company	Matthew Mamera / Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	johan@donnawayl.co.za
Social Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Cell: 082 493 5166	johan@donnawayl.co.za
Traffic Assessment Study	iWink Consulting (Pty) Ltd	Iris Wink	Plattekloof Glen Cape Town	Cell: 082 691 9096	iris@iwink.co.za

1.4 STATUS OF THE BA PROCESS

The BA process is conducted strictly in accordance with the stipulations set out in Regulations 19 – 20 and Annexure 1 of Regulation No. 326. Table 1.3 provides a summary of the BA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted on 26 September 2022 and site notices were erected.
- A newspaper advertisement was placed in the Witbank News on 30 September 2022 for the initial public participation.
- A pre-application meeting request and public participation plan was submitted to DFFE on 23 September 2022. The DFFE confirmed that no pre-application meeting is necessary for the project per email on 05 October 2022.
- An application for Environmental Authorisation and the draft BAR was submitted to the DFFE on 14 December 2022.
- The Draft Basic Assessment report was made available for a 30-day review and comment period from 06 January 2023 to 06 February 2023.
- The Final Basic Assessment report was submitted to the DFFE on 15 March 2023 for decision making.

It is envisaged that the BA process should be completed within approximately five months of submitting the Application for EA and the BAR, i.e. by June 2023 – see Table 1.3.

Table 1.3: Project schedule

Activity	Prescribed timeframe	Timeframe
Submit per-application meeting request	-	23 September 2022
Site visits (Initial PP – Press Advertisement & Site Notices).	-	26 September & 05 October 2022
Receive specialist studies	-	November 2022 (4 weeks)
Submit application form and DBAR	-	06 January 2023
Public participation (DBAR)	30 Days	06 January 2023 – 06 February 2023
Submit FBAR	90 Days	15 March 2023
Department acknowledges receipt	10 Days	March 2023
Decision	57 Days	By May 2023
Department notifies of decision	5 Days	By May 2023

Registered I&APs notified of decision	14 Days	May 2023
Appeal	20 Days	By June 2023

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.

Table 1.4: Specialist studies identified by the DFFE Screening tool and specialist studies conducted

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 D4. The high sensitivity is disputed by the report.
Landscape / Visual Impact Assessment Sensitivity: Very High	Yes	A Visual Impact Assessment is included in Appendix D3.
Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment is included in Appendix D4.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Palaeontological Impact Assessment is included in Appendix D5.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Terrestrial Biodiversity Assessment Report is included in Appendix D1. 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 D1. 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 D2. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Civil Aviation Assessment Sensitivity: Low	No	Study not included. Refer to section 2 of the site verification report.
Defence Theme Sensitivity: Low	No	Study not included. Refer to section 2 of the site verification report.
RFI Assessment Sensitivity: Low	No	Study not included. Refer to section 2 of the site verification report.
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: Medium	Yes	Refer to Appendix D1. 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: High	Yes	Refer to Appendix D1. 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 1 of Regulation No.326. It consists of seven 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 BAR as specified in the Regulations		Section in report
Appendix 1. (3) - A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(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 as well as the associated structures and infrastructure 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 and being applied for; and	
	(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:	
	(i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	3
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	
(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 motivation for the preferred site, activity and technology alternative.	
(h)	a full description of the process followed to reach the preferred alternative 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;	5
	(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;	
	(v) the impacts and risks identified 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;	6 & 7

	(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;	
	(ix) the outcomes 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;	
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -	
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(j)	an assessment of each identified potentially significant impact and risk, including-	
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	

(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	6
(l)	an environmental impact statement which contains-	8
	(i) a summary of the key findings of the environmental impact assessment:	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Not applicable
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Not applicable
(r)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A 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 (I&APs);	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	

	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(t)	any specific information that may be required by the CA; and	Not applicable
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

2 ACTIVITY DESCRIPTION

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

Appendix 1. (3) An BAR (...) 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 or activities applied for as well as the associated structures and infrastructure 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 and being applied for;

(ii) a description of the associated structures and infrastructure related to the development.

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 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279, Registration Division JS, Mpumalanga Province situated within the eMalahleni Local Municipality. The proposed development is located in the Mpumalanga Province in the north eastern interior of South-Africa (refer to Figure B for the regional map). The town of Witbank is located approximately 15km southeast of the proposed development (refer to Figure A for the locality map).

The project entails the generation of up to 300MW electrical power through the operation of photovoltaic (PV) panels. The total development footprint of the project will approximately be 469 hectares (including supporting infrastructure on site, however excluding the overhead power line) within the 673 hectares identified and assessed as part of the Basic Assessment process, which is located within the affected properties – refer to Table 2.1 for general site information. The properties on which the facility is to be constructed will be leased by Highveld Solar Power Plant (RF) (Pty) Ltd from the property owner, Smith Broers Trust, for the lifespan of the project (minimum of 20 years).

Table 2.1: General site information

Description of affected farm portion	<u>Solar Power Plant</u> Portion 17 of the Farm Kleinwater No. 301 Remainder of Portion 2 of the Farm Kromdraai No. 279 Remainder of Portion 15 of the Farm Kromdraai No. 279 Portion 47 of the Farm Kromdraai 47 No. 279 Portion 48 of the Farm Kromdraai 48 No. 279 <u>Power Line</u> Remainder of the farm Coronation No.280 Remainder of Portion 2 of the Farm Kleinwater No.301 Portion 6 of the Farm Nooitgedacht No. 300 Remainder of Portion 12 of the Farm Nooitgedacht No. 300 Remainder of Portion 13 of the Farm Nooitgedacht No. 300 Portion 15 of the Farm Nooitgedacht No. 300 Portion 21 of the Farm Nooitgedacht No. 300 Portion 22 of the Farm Nooitgedacht No. 300 Portion 25 of the Farm Nooitgedacht No. 300 Portion 30 of the Farm Nooitgedacht No. 300 Remainder of Portion 94 of the Farm Nooitgedacht No. 300 Remainder of Portion 95 of the Farm Nooitgedacht No. 300 Portion 121 of the Farm Nooitgedacht No. 300 Portion 122 of the Farm Nooitgedacht No. 300 Portion 126 of the Farm Nooitgedacht No. 300 Portion 127 of the Farm Nooitgedacht No. 300 Portion 131 of the Farm Nooitgedacht No. 300 Portion 141 of the Farm Nooitgedacht No. 300 Portion 148 of the Farm Nooitgedacht No. 300

Province	Mpumalanga
District Municipality	Nkangala District Municipality
Local Municipality	eMalahleni Local Municipality
Ward numbers	11
Closest towns	Witbank is located approximately 15 km south east of the proposed development.
21 Digit Surveyor General codes	<u>Solar Power Plant</u> Portion 17 of the Farm Kleinwater No. 301 T0JS00000000030100017 Remainder of Portion 2 of the Farm Kromdraai No. 279 T0JS00000000027900002 Remainder of Portion 15 of the Farm Kromdraai No. 279 T0JS00000000027900015 Portion 47 of the Farm Kromdraai No. 279 T0JS00000000027900047 Portion 48 of the Farm Kromdraai 48 No. 279 T0JS00000000027900048 <u>Power Line</u> Remainder of the Farm Coronation No. 280 T0JS00000000028000000 Remainder of Portion 2 of the Farm Kleinwater No. 301 T0JS00000000030100002 Portion 6 of the Farm Nooitgedacht No. 300 T0JS00000000030000006 Remainder of Portion 12 of the Farm Nooitgedacht No. 300 T0JS00000000030000012 Remainder of Portion 13 of the Farm Nooitgedacht No. 300 T0JS00000000030000013 Portion 15 of the Farm Nooitgedacht No. 300

	T0JS00000000030000015 Portion 21 of the Farm Nooitgedacht No. 300 T0JS00000000030000021 Portion 22 of the Farm Nooitgedacht No. 300 T0JS00000000030000022 Portion 25 of the Farm Nooitgedacht No. 300 T0JS00000000030000025 Portion 30 of the Farm Nooitgedacht No. 300 T0JS00000000030000030 Remainder of Portion 94 of the Farm Nooitgedacht No. 300 T0JS00000000030000094 Remainder of Portion 95 of the Farm Nooitgedacht No. 300 T0JS00000000030000095 Portion 121 of the Farm Nooitgedacht No. 300 T0JS00000000030000121 Portion 122 of the Farm Nooitgedacht No. 300 T0JS00000000030000122 Portion 126 of the Farm Nooitgedacht No. 300 T0JS00000000030000126 Portion 127 of the Farm Nooitgedacht No. 300 T0JS00000000030000127 Portion 131 of the Farm Nooitgedacht No. 300 T0JS0000000003000013 Portion 141 of the Farm Nooitgedacht No. 300 T0JS00000000030000141 Portion 148 of the Farm Nooitgedacht No. 300 T0JS00000000030000148
Type of technology	Photovoltaic solar facility

Structure Height	Panels ~6m, buildings ~ 6m, power line ~32m and battery storage facility ~8m height
Battery storage	Within a 4-hectare area
Surface area to be covered (Development footprint)	Approximately 469 ha
EIA footprint	Assessed 673 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 located in order to capture the most sun.
Generation capacity	Up to 300MW
Expected production	678 GWh per annum

Over the affected properties an area of 673 hectares have been assessed and a preferred development footprint of 500ha has been identified within this larger area. The development footprint was further reduced from 500ha to 469ha to ensure avoidance of the high sensitivity areas on the project site. The layout of the facility was optimised to avoid the "Rocky Outcrop" area identified by the Terrestrial Biodiversity Assessment (Appendix D1), as well as the Hydrogeomorphic Units (HGM) identified by the Wetland Baseline and Risk Assessment (Appendix D1). Refer to Figure H3 of the final Bar for the layout and sensitivity map. The amended layout has been included as Figure I of the Final Basic Assessment Report.

The site is located in a rural area and is bordered by farms where mainly agricultural activities are undertaken and mining activities. The site survey revealed that the affected properties currently consist of grazing cattle as well as crop production through the use of pivot irrigation – refer to plates 1-9 for photographs of the development area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activity:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside*

amended in 2017)		*urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as 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 (132 kV), an on-site HV/MV substation (130 MVA, High Voltage:88/132kV, Medium Voltage: 33kV) and switching station. It is expected that generation from the facility will tie in with the existing Eskom Vulcan 400kV MTS Substation. The connection power line will be constructed within the limits of the pre-negotiated grid connection corridor assessed within the 250m wide (up to 690m in some instances) grid connection corridor.
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 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 such as

		diesel in containers with combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres. The dangerous goods will be stored in a bunded area within the construction site during the construction phase. During the operational phase the dangerous goods will be stored in a bunded area within the operations and maintenance areas. The dangerous goods to be stored on site relates to diesel/petrol and oil.
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 meters from a watercourse."* • Activity 19 is triggered as the 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 roads will vary between 4 and 12 meters in width. The internal roads will be up to 6m in width, the perimeter road will be up to 8m in width and the access road will be up to 12 m 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 properties have been used for grazing and the properties will be re-zoned to "special" use for the

		proposed development. The development footprint of the solar power plant will be 469 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 as the existing access to the affected properties does not have a reserve and will need to be widened by more than 6 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 300 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 Rand Highveld Grasslands (Gm11) and majority of the grid connection corridor falls within the Eastern Highveld Grasslands (Gm12) which is described by Mucina and Rutherford (2006) as 'endangered'. Activity 15 is triggered since portions of the site have 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 469 hectares.
GNR. 324 (as amended in 2017)	Activity 4 (f)(i)(ee)	• *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) in the Mpumalanga province, (i) outside urban areas and within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans*". • Activity 4(f)(i)(ee) is triggered since the roads will not have a reserve and will vary between 4 and 12 meters in width. The internal roads will be up to 6m in width,

		the perimeter road will be up to 8m in width and the access road will be up to 12 m in width. The project is located within the Mpumalanga Province and falls outside of an urban area but a portion of the PV development footprint and grid connection corridor falls within CBA 2 as identified in the Mpumalanga 2015 Biodiversity Plan.
GNR. 324 (as amended in 2017)	Activity 10 (f)(i)(ee)(hh)	• *"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 (f) in the Mpumalanga Province (i) outside urban areas and 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 edge of a watercourse or wetland."* • Activity 10(f)(i)(ee)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel) in containers with a combined capacity of 80 cubic metres. The dangerous goods will be stored in a bunded area within the construction site during the construction phase. During the operational phase the dangerous goods will be stored in a bunded area within the operations and maintenance areas. The dangerous goods to be stored on site relates to diesel/petrol and oil. The project is located within the Mpumalanga Province and falls outside of an urban area, but a portion of the PV development footprint and a portion of the grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2015 Bioregional Plan. Furthermore, nine wetland features were identified within the 100 meters of the proposed development which includes channelled valley bottoms, unchanneled valley bottoms and hillslope seep wetlands.

GNR. 324 (as amended in 2017)	Activity 12 (f)(ii)(iii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation…(f) in the Mpumalanga (ii) 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 Spatial Biodiversity Assessment 2004 and (iii) within critical biodiversity areas identified in bioregional plans."* • Activity 12(f)(ii)(iii) is triggered since the proposed development is located in the Mpumalanga province and the vegetation on site is classified as being 'endangered'. Portions of the site have not been lawfully disturbed during the preceding ten years. A portion of the PV development footprint and grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2019 Biodiversity Plan.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(f)(i)(ff)	• *"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 (f) Mpumalanga 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."* • Activity 14(ii)(a)(c)(f)(i)(ff) is triggered as the 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 proposed development is located in the Mpumalanga province, outside of an urban area. A portion of the PV development footprint falls within CBA 2 and ESA 2, and the grid connection corridor falls

		within a CBA 2 as identified in the Mpumalanga 2015 Bioregional Plan.
GNR. 324 (as amended in 2017)	Activity 18 (f)(i)(ee)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (f) in the Mpumalanga (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* • Activity 18 (b)(i)(ee) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The proposed development is located in the Mpumalanga province, outside of an urban area. A portion of the PV development footprint and grid connection corridor falls within a CBA 2 as identified in the Mpumalanga 2015 Bioregional Plan.

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

- Site clearing and preparation: Certain areas of the site will need to be cleared of vegetation and access to the site will need to be confirmed.
- Civil works to be conducted:
    - 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 roads/paths – existing paths will be used were reasonably possible. Short access roads will be used to link the site with an existing gravel road off the unnamed Road. 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 layering 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 300MW, 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 Central 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. Whilst Highveld Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with the existing Eskom Vulcan 400kV MTS Substation. The connection power line will be constructed within the limits of the grid connection corridor assessed within the 250m wide (up to 690m in some instances) grid connection corridor. Project will inject up to 300MW into the National Grid.

  Figure 2.1 below provides an indication of the grid connection corridor and footprint for the Highveld Solar Power Plant.

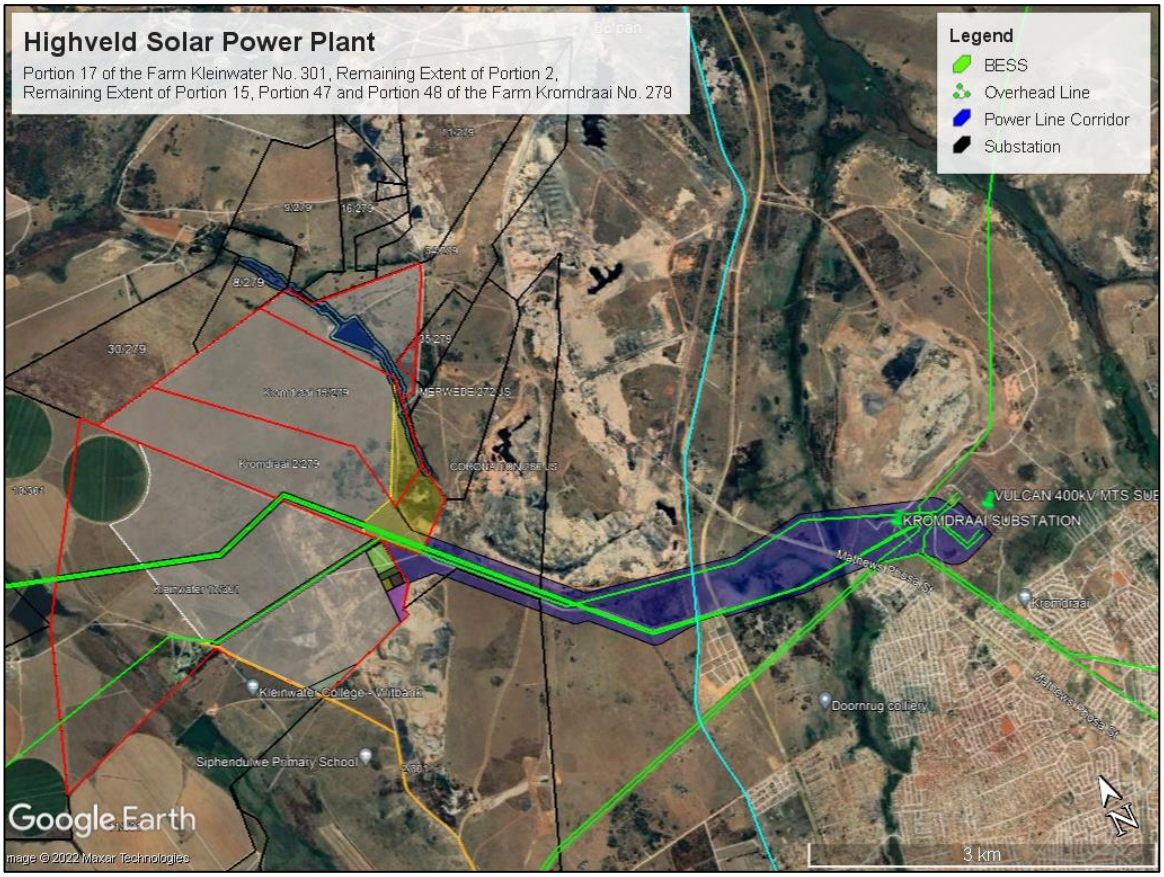


Figure 2.1: Proposed pre-negotiated grid connection corridor for the Highveld Solar Power Plant

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

- Supporting Infrastructure – The following auxiliary buildings will be within a 5.74ha Operations and Maintenance laydown area with basic services including water and electricity will be required on site:

    - Office
    - Switch gear and relay room
    - Staff lockers and changing room and
    - Security control

- Battery Energy Storage System – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m^3 of batteries and associated operational, safety and control infrastructure.

- Roads – Access will be obtained via an unnamed road off of the N4 to the south of the site and via another unnamed road to the east of the site. Three access points are proposed

access by the Substation and O&M area 1, access to the South entrance of the site and access to the north portion. 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 properties. 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. The total surface area covered by the layout include the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power lines, onsite substation and switching station and perimeter fences). Limited environmental features of significance exist on site which includes a 'Rocky Outcrop' and nine (9) Hydrogeomorphic units (hillslope seep, channelled and unchanneled valley bottom wetlands). An amended layout plan is included in as Figures H and I. Table 2.2 below provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

Table 2.2: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	469 hectares (Development footprint) 673 hectares (EIA Footprint – area assessed)
Number of inverters required	Minimum 40
Area occupied by inverter / transformer stations / substations / BESS	Central inverters+ LV/MV trafo: 750 m^2 HV/MV substation with switching station: 15 000 m^2 or 1.5ha BESS: 40 000 m^2 or 4ha
Capacity of on-site substation	132kV
Capacity of the power line	132kV
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 469 hectares Construction Laydown Area: 5.74ha
Area occupied by buildings	Security Room: ~163 m^2

	O&M and laydown area 1: 1.5 ha O&M and laydown area 2: 3.74 ha O&M and laydown area 3: 0.5 ha
Battery storage facility	Maximum height: 8m Maximum volume: 1740 m^3
Length of internal roads	Approximately 16 km
Width of internal roads	Between 4 and 6 meters
Grid connection corridor width	Up to 250m, with some areas being ~690m wide
Grid connection corridor length	5.3 km
Power servitude width	32m
Height of fencing	Approximately 2.5 meters

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

Table 2.4: Coordinates

Facility Coordinates			
Project Site (Development footprint)	A	25°49'13.02"S	29° 3'9.91"E
	B	25°48'43.94"S	29° 3'9.94"E
	C	25°48'46.82"S	29° 2'42.81"E
	D	25°48'43.92"S	29° 2'37.74"E
	E	25°48'4.89"S	29° 2'27.26"E
	F	25°48'4.87"S	29° 2'37.39"E
	G	25°47'57.61"S	29° 2'46.39"E
	H	25°47'48.99"S	29° 2'46.40"E
	I	25°47'43.78"S	29° 3'52.55"E
	J	25°47'58.23"S	29° 4'4.49"E

	K	25°48'8.06"S	29° 4'4.48"E
	L	25°48'32.90"S	29° 3'50.29"E
	M	25°48'35.69"S	29° 3'38.80"E
	N	25°48'38.49"S	29° 3'38.30"E
	O	25°48'42.18"S	29° 3'42.20"E
	P	25°48'56.52"S	29° 3'43.99"E
	Q	25°49'2.31"S	29° 3'39.08"E
	R	25°49'4.36"S	29° 3'39.87"E
	S	25°48'3.19"S	29° 4'12.44"E
	T	25°47'40.66"S	29° 4'6.21"E
	U	25°47'39.42"S	29° 4'2.70"E
	V	25°47'34.31"S	29° 3'59.66"E
	W	25°47'36.65"S	29° 4'30.44"E
	X	25°48'3.93"S	29° 4'13.86"E
Access Points and Roads			
Access Point 1 (Substation)	1	26°56'41.54"S	26°48'17.84"E
Access Road 1 (Substation)	1	25°48'55.89"S	29° 3'56.13"E
	2	25°48'55.86"S	29° 3'49.88"E
	3	25°48'55.83"S	29° 3'43.90"E
Access Point 2 (Small portion in the North)	1	26°57'15.20"S	26°48'48.72"E
Access Road 2 (Small portion in the North)	1	25°48'4.30"S	29° 4'14.77"E
	2	25°48'4.06"S	29° 4'14.37"E
	3	25°48'3.81"S	29° 4'13.92"E
Access point 3 (South Entrance)	1	25°49'14.33"S	29° 3'5.03"E
	1	25°49'14.33"S	29° 3'5.03"E

Access road 3 (South Entrance)	2	25°49'13.61"S	29° 3'7.50"E
	3	25°49'12.90"S	29° 3'9.91"E
Grid Connection Corridor			
Power Line Corridor	A	25°48'56.40"S	29° 3'43.98"E
	B	25°48'57.09"S	29° 3'52.92"E
	C	25°49'27.22"S	29° 4'25.04"E
	D	25°49'28.10"S	29° 4'29.46"E
	E	25°49'42.08"S	29° 4'43.96"E
	F	25°49'42.73"S	29° 4'45.44"E
	G	25°49'42.81"S	29° 4'47.13"E
	H	25°49'42.37"S	29° 4'59.32"E
	I	25°49'41.73"S	29° 4'59.73"E
	J	25°49'42.98"S	29° 5'7.94"E
	K	25°49'44.16"S	29° 5'8.23"E
	L	25°49'48.15"S	29° 5'35.26"E
	M	25°49'47.86"S	29° 5'37.28"E
	N	25°49'49.17"S	29° 5'57.86"E
	O	25°49'52.09"S	29° 6'11.06"E
	P	25°49'55.59"S	29° 6'16.17"E
	Q	25°49'59.59"S	29° 6'20.66"E
	R	25°49'59.44"S	29° 6'25.78"E
	S	25°49'56.45"S	29° 6'34.80"E
	T	25°49'44.23"S	29° 6'29.91"E
	U	25°49'45.05"S	29° 6'27.33"E
	V	25°49'40.55"S	29° 6'24.41"E
	W	25°49'39.15"S	29° 6'19.94"E
	X	25°49'27.45"S	29° 5'43.31"E

	Y	25°49'29.95"S	29° 5'18.87"E
	Z	25°49'20.79"S	29° 4'32.49"E
	AA	25°48'43.45"S	29° 3'52.01"E
	AB	25°48'32.93"S	29° 3'50.31"E
	AC	25°48'35.70"S	29° 3'38.80"E
	AD	25°48'38.45"S	29° 3'38.30"E
	AE	25°48'42.15"S	29° 3'42.19"E
Substation	1	25°48'52.29"S	29° 3'37.15"E
	2	25°48'52.21"S	29° 3'42.54"E
	3	25°48'55.46"S	29° 3'42.59"E
	4	25°48'55.54"S	29° 3'37.21"E
Battery Energy Storage System (BESS)	1	25°48'43.24"S	29° 3'36.75"E
	2	25°48'42.71"S	29° 3'41.72"E
	3	25°48'51.51"S	29° 3'42.82"E
	4	25°48'51.58"S	29° 3'36.89"E

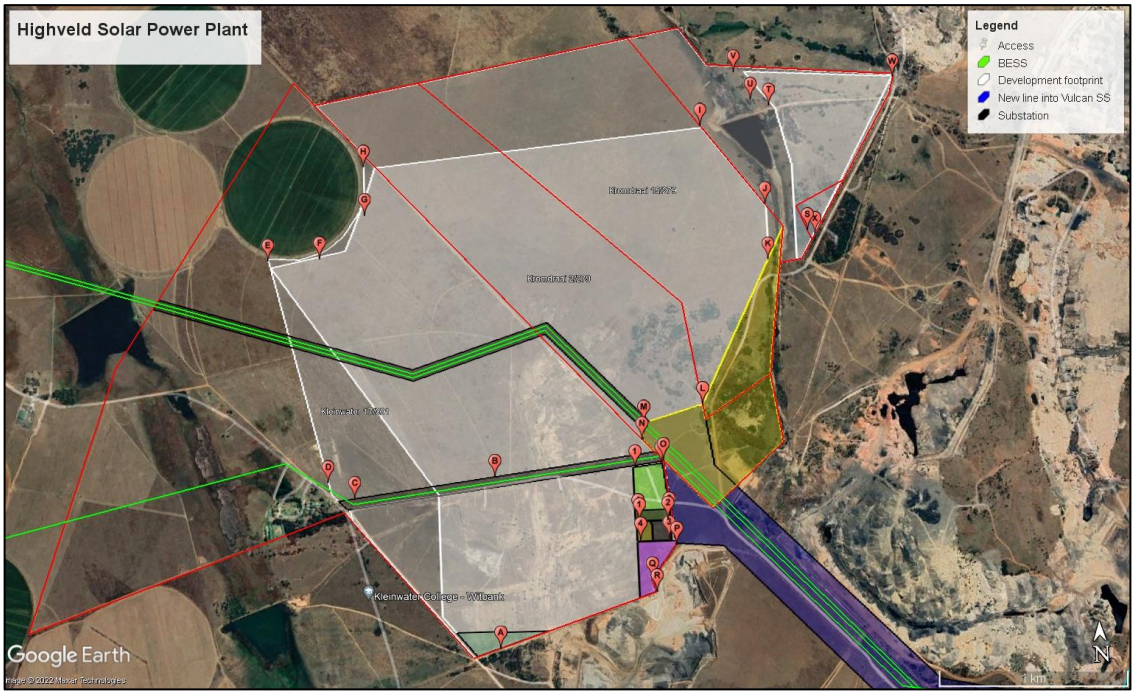


Figure 2.2 : Map indicating coordinate points of the proposed Highveld Solar Power Plant (including project site, substation and BESS)

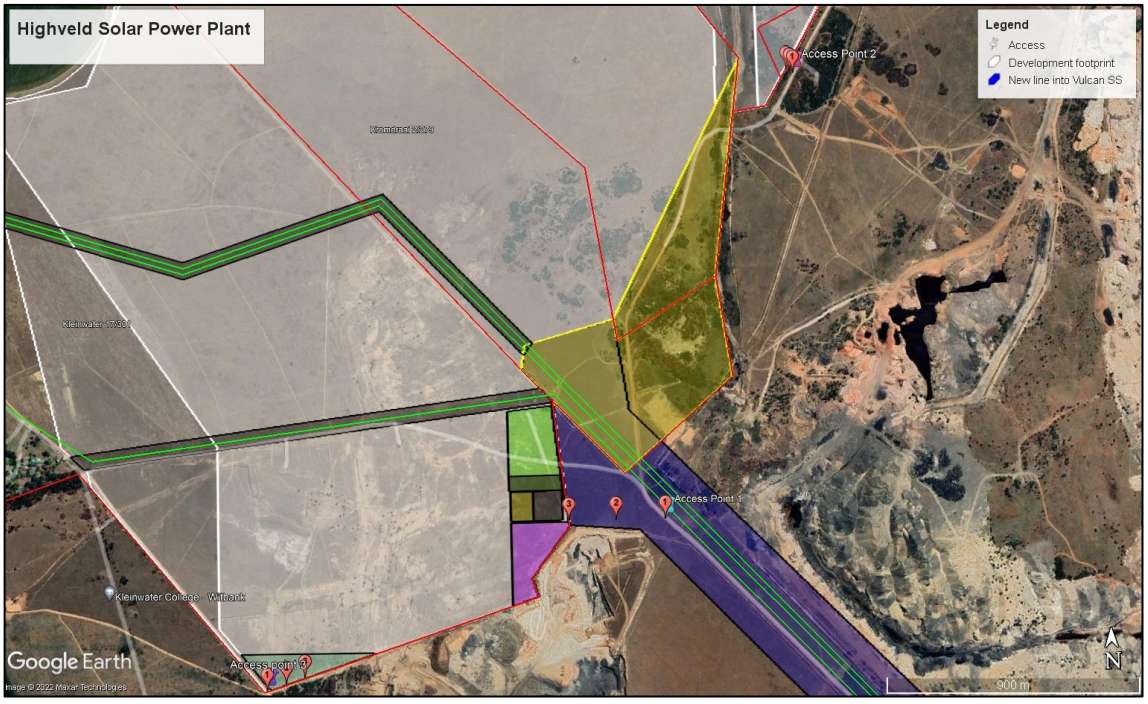


Figure 2.3: Map indicating coordinate points of the proposed Highveld Solar Power Plant proposed access roads.

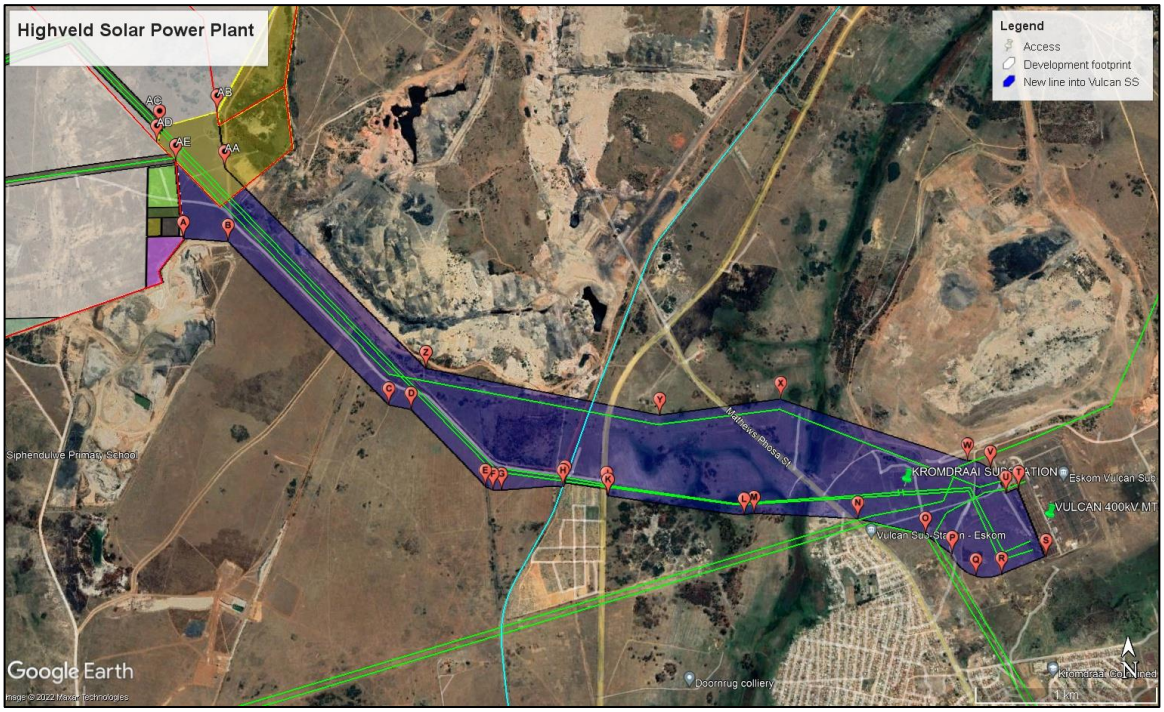


Figure 2.4: Map indicating coordinate points of the proposed Highveld Solar Power Plant proposed pre-negotiated power line corridor.

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 the local municipality, or alternatively from ground water resources. The Department of Water and Sanitation has been asked by the Applicant to confirm the water resource availability in the relevant catchment management area in order to ensure sustainable water supply. 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 for the development of the project or is successful as part of any other generation programme.

The estimated maximum amount of water required during construction is 45000m³ per year during the 18 - 24 months of construction. The estimated maximum amount of water required during the facility's 20 years of operation is 7000m³ per annum. The majority of this usage is for the cleaning of the solar panels during the operation phase. 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 and it is noted that the eMalahleni Local Municipality remains the Water Service Authority in the area.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of storm water, the capture and use of rainwater from gutters and roofs would 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 Storm water

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Storm water management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F.

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 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 operation 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) will be 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) (Appendix G).

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 affected properties 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 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 the 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 1. (3) A BAR (...) must include-

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants and associated infrastructure 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 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
- New Growth Path Framework

- Mpumalanga Provincial Spatial Development Framework (PSDF) (2012)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Nkangala DM Final Draft Integrated Development Plan (IDP) 2021 – 2022 (2021)
- eMalahleni Local Municipality Draft Integrated Development Plan 2021/2022 (2021)

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 Highveld 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 Forestry, Fisheries and the Environment (DFFE) and the Mpumalanga Province Department of Economic, Small	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.

	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 BA process undertaken for the Highveld 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 Highveld 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 and Sanitation (DWS)	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 falls within the B20G quaternary drainage region, this drainage region falls under Zone J, which refers to the amount of water that may be taken from the ground water resource, per hectare. The drainage region forms part of the Olifants Water Management 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 of Forestry, Fisheries and the Environment (DFFE)	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 of Forestry, Fisheries and the Environment (DFFE)	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 Highveld Solar Power Plant and all relevant documents were submitted for their comments and approval, an interim comment has been submitted by SAHRA on the proposed project. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix D5 and the Paleontological Impact Assessment report is included as Appendix D6 to this Final BAR.
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 Rural Development and Land Reform in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long -term lease agreement.

			An Agricultural Compliance Statement has been undertaken for the Highveld Solar Power Plant and is included as Appendix D4 of this Final BAR.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	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 Highveld Solar Power Plant and is included in Appendix D1 of this Final BAR.

Mpumalanga Nature Conservation Ordinance, 1969 (Act 8 of 1969)	Mpumalanga Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	1969	The Act provides for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto. This includes wild animals, fish, indigenous plants, as well as nature reserves. The Act also provides for the permitting of the disturbance of such species. A Terrestrial Biodiversity, Plant and Animal Species Impact Assessment has been undertaken for the Highveld Solar Power Plant and is included in Appendix D1 of this Final BAR.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the construction of solar PV 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 Highveld 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 Highveld Solar Power Plant is in line with this policy 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 Highveld SPP. 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 has been updated and were open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. The draft IRP of 2018 was open for comments until the end of October 2018. For the revision scenario analysis were conducted and the results thereof are included in the draft IRP of 2018. 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 draft 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 consideration 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 Highveld 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 need to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, 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 Highveld 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 stretches 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 development of the Highveld Solar Power Plant is in line with SIP 8 and SIP 9 as it will provide "Green" energy in support of the South African Economy and will generate electricity which supports socio-economic development. The proposed power line associated with the Highveld Solar Power Plant is in line with SIP 10 as it will facilitate electricity transmission and distribution for all.
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 on 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 Highveld Solar Power Plant is considered to be in-line with the framework.

Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Forestry, Fisheries and the Environment (DFFE)	2014	The then Department of Environmental Affairs (DEA) 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 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 proposed site falls within the eMalhaleni REDZ (refer to Figure D).
Mpumalanga Provincial Spatial Development Framework (PSDF)	Mpumalanga Provincial Government	2012	The Mpumalanga Vision 2030 Strategic Implementation Framework (2013-2030) was established as a direct implementation response to the National Development Plan Vision, 2030. The framework describes the province's approach to realizing the objectives of the NDP in the provincial context and seeks to achieve the MPG's Provincial Strategic Objectives (PSO's). Mpumalanga Vision, 2030 provides a provincial expression of the key priorities, objectives and targets that enumerated in the NDP and expressed within the policy. It seeks to present and affirm the province's approach towards realising the national vision and development plan. The implementation framework builds on and informs past and existing sectorial and related planning interventions within the province. The Vision 2030 Implementation Framework provides a basis for prioritisation during medium-term and annual planning cycles. The focus of the Mpumalanga Vision 2030 is to provide a summary overview of the facilitation of decision-making and the prioritisation

of rolling back poverty, and inequality by raising living standards to an acceptable minimum, which entails a combination of interventions directed at increasing employment, improving the quality of education, productive growth, a social wage and good quality public services.

The objective of the Implementation Framework is to overcome a disjointed approach to planning in the province by ensuring that all stakeholders approach the implementation of Vision 2030 through commonly agreed strategies and programmatic interventions. The objective is to also provide a strategic overview in order to set high level provincial targets; inform choices and trade-offs and to locate strategies, programmes and projects within a focused spatial representation of the content. In addition to and prior to this framework, the Mpumalanga Government already had a number of plans and strategies in place which were used as a starting point for the Implementation Framework. Each of these plans has identified challenges and actions that have been incorporated within the broad framework of the National Development Plan which translates into the Mpumalanga Vision 2030. The key element in this approach was to ensure that the plan incorporates a focused spatial representation of the content and intention.

Mpumalanga Vision 2030 includes key targets for the province that are in line with those expressed in the NDP. These targets have been developed with due consideration given to the specific demographic, institutional, spatial and socio-economic advantages and challenges of the province. These targets include:

- Economy and Unemployment Targets;
- Education, Training and Innovation Targets;
- Health Care Targets; and
- Social Protection Targets.

The Mpumalanga Economic Growth and Development Path (MEGDP) is informed by the National Economic Growth Path. The Mpumalanga Province is committed at increasing local economic development and job creation in the agricultural, industrial, manufacturing, green economy, tourism and mining sectors. The MEGDP provides a detailed framework for the realisation of these objectives. The focal point of the Economic Growth and Development Path is the creation of appropriate labour absorbing jobs which will

			have a positive direct, indirect and induced effects on the Provincial economy and the living standards of its people. The primary objective of the MEGDP is to grow the economy of the province; balance growth and development in order to create jobs, reduce poverty and inequality and improve the socio-economic conditions of the province. The growth plan is anchored on a few factors including sector development, Inclusive & shared growth, spatial distribution, regional integration, sustainable human development and environmental sustainability with clearly defined strategic targets over the medium to long term period. The Mpumalanga PSDF outlines nine interrelated strategic objectives which were identified as Strategic Focus Areas (areas of Intervention on Provincial, District and local level): o Strategic Objective 1: Capitalize on regional spatial development initiatives o Strategic Objective 2: Focus development on development corridors and nodes. o Strategic Objective 3: Protect biodiversity and agricultural resources. o Strategic Objective 4: Economic development and job creation supporting and guiding the spatial development pattern of Mpumalanga. o Strategic Objective 5: Accommodating urbanization within the province. o Strategic Objective 6: The integration of the historically disadvantaged communities into a functional nodal and settlement pattern. o Strategic Objective 7: Tenure Upgrading. o Strategic Objective 8: Promote the development of rural areas that can support sustainable economic, social and engineering infrastructure. o Strategic Objective 9: Infrastructure Investment. The development of the Highveld Solar Power Plant is in-line with the framework based on the contributions and opportunities presented by a development of this nature.
Nkangala District Municipality Final Draft	Nkangala District Municipality	2021 - 2022	The long-term vision of the Nkangala DM is: *"Improving quality of life for all".* The above stated vision defines what Nkangala District Municipality (NDM) would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is that: *"The NDM*

Integrated Development Plan (IDP)			*is committed to the improvement of the physical, socio-economic and institutional environment in order to address triple challenges through sustainable development and service excellence".* In order to support the vision and mission of NDM, seven Values have been identified. These values are: o To promote and pursue key national, Provincial and local development goals as enriched in vision 2030 o To be inclusive and caring organization o To be democratic transparent, accountable and participative in pursuance of our objectives o To be responsive to the needs of citizens and Partner-Local Municipalities o To cultivate a work ethic focused on performance, achievement and results o To be democratic in the pursuance of our objectives o To show mutual respect, trust and ensure high levels of co-operation and discipline in our dealing with one another. Considering the plans for the alignment of the DM's plans with SIP 8 and SIP 9 it is confirmed that the Highveld Solar Power Plant is in line with the plan.
EMalahleni Local Municipality Draft Integrated Development Plan (IDP)	EMalahleni Local Municipality	2021-2022 (2021)	The vision of the Emalahleni LM is to "*To be a centre of excellence and innovation."* The Mission Statement is *"Empowerment of our communities and providing innovative and excellent service that is conducive for sustainable economic development and social transformation."* The vision and mission of the municipality have led to the conceptualisation of the following core values: o Accountability o Transparency o Excellence o Integrity o Responsiveness o Innovative.

The municipality also identified the top five goals that they want to achieve:

- Spatial transformation and social cohesion
- Sustainable and affordable services
- Clean administration and good governance
- Financial viability
- Socio-economic growth and a safe environment.

In order to support the vision and mission of the municipality, the municipality identified a few strategic objectives:

- To provide support, advice and facilitate through alignment of the institutional arrangements
- To provide access to habitable, sustainable and affordable intergraded human settlements
- To increase access to efficient and sustainable basic services
- To provide an enabling environment for social and recreational development
- To create a clean, healthy and safe sustainable environment
- To create an attractive and conducive environment for sustainable economic development and tourism
- To promote spatial concentration and facilitate, manage and control integrated land use and spatial planning
- To strengthen good governance and public participation
- To ensure sound financial and asset management
- To ensure sustainable provision of suitable transport.

The development of the Highveld Solar Power Plant will contribute to the local economy of the area and therefore assist (albeit to a limited extent) with socio-economic growth and therefore contribute to the strategic objectives of the LM.

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 BA:

- The Equator principles III (2013)[3]
- 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). Draft 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
- DEAT, (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

[3] 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 Basic Assessment was undertaken in accordance with the EIA Regulations (2017) 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. For this reason, the proposed development project will be assessed and has been considered 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 Highveld 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 generations 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 increase energy supply 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 indirectly support the applications of renewables as it will contribute to surety of electricity supply and improving the lives of the community.

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 Highveld 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 1. (3) A BAR (...) must include-

(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;

4.1 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 Word bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO_2 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 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 the 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 draft IRP 2018 as per table 4.1 below:

Table 4.1: Published Draft 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 Mpumalanga 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.
- 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 Greenhouse Gas (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 fuels 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 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 utilisation 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 35 - 50 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 (shallow soils), the site has limited suitability for cultivated crops, and viable agricultural land use is limited to grazing only, with limited areas under pivot irrigation. The proposed development in this specific area will generate alternative land use income through rental for the 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 by the landowner.
- Location of the activity within a REDZ - The Renewable Energy Development Zones (REDZ) have a key role to play in the South Africa's just energy transition. The REDZ create priority areas for investment in the electricity grid. Since the site is located within a REDZ it contributes to the desirability of the project.
- 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 1. (3) A BAR (...) must include-

(g) A motivation for the preferred site, activity and technology alternative;

(h) a full description of the process followed to reach the proposed preferred alternative, 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;

(viii) 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;

(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 alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

The DFFE 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 (refer to Appendix E) was conducted by the developer on Portion 1 of the Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279 and the project site was found to be favourable due to its proximity to grid connections, environmental conditions, relatively flat terrain, high solar radiation values and adequate site access. Some areas of the farm have been deemed less suitable for the proposed development such as areas under crop production through the implementation of pivot irrigation. These factors were taken into consideration and avoided as far as possible. The site selection also took the site

geology, terrain, conservation planning, land capability, grazing capability, water availability and land use into consideration before deciding the specific site (Subsolar, 2022).

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

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 5.3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for grazing for cattle (refer to the photographs of the site). It must be noted that the areas under pivot irrigation have been excluded from the development footprint and will therefore continue to be used for crop production. However, it should be noted that the area surrounding the proposed project is already impacted by mining activities, as well as agricultural activities. The site has limited agricultural potential due to climatic limitation and the soils which are unsuitable for crop production due to the shallow depth (see Agriculture Compliance Statement in Appendix D4). The potential opportunity costs in terms of alternative land use income through rental for the energy facility and the supporting social and economic development in the area would be lost if the status quo persists.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the project. No other properties have at this stage been secured by Highveld Solar Power Plant (RF) (Pty) Ltd in the Witbank area to potentially establish the solar energy facility. From a local perspective, Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279, is preferred due to its suitable climatic conditions, topography (i.e. in terms of gradient), environmental conditions (i.e. agricultural potential, ecological sensitivity), proximity to a feasible 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).

The proposed development falls within an area used for grazing, and avoids areas under crop production through pivot irrigation. The site is considered to have limited environmental sensitivity, however provision has been made to avoid sensitive environmental features on site.

Over the five affected properties an area of 673 hectares have been assessed and a preferred development footprint of 500ha have been identified within this larger area. The project footprint was further reduced from 500ha to 469ha following input from the DFFE Directorate: Biodiversity and Conservation during the 30-day review and commenting period of the draft BAR. Refer to Appendix C5 and Appendix C6 for the comments received. The layout of the facility has been amended to avoid the High Sensitivity 'Rocky Outcrop' as identified by the Terrestrial Biodiversity Assessment (Appendix D1) and No-Go areas as indicated by the comments received from the Directorate.

No alternative areas for the development footprint within the five affected properties have been considered for the placement of infrastructure based on feedback from the landowner and the current land use areas (i.e. productive areas under pivot irrigation). The footprint have been reduced to accommodate environmentally sensitive features as indicated by Figure 5.1 and 5.2 below.

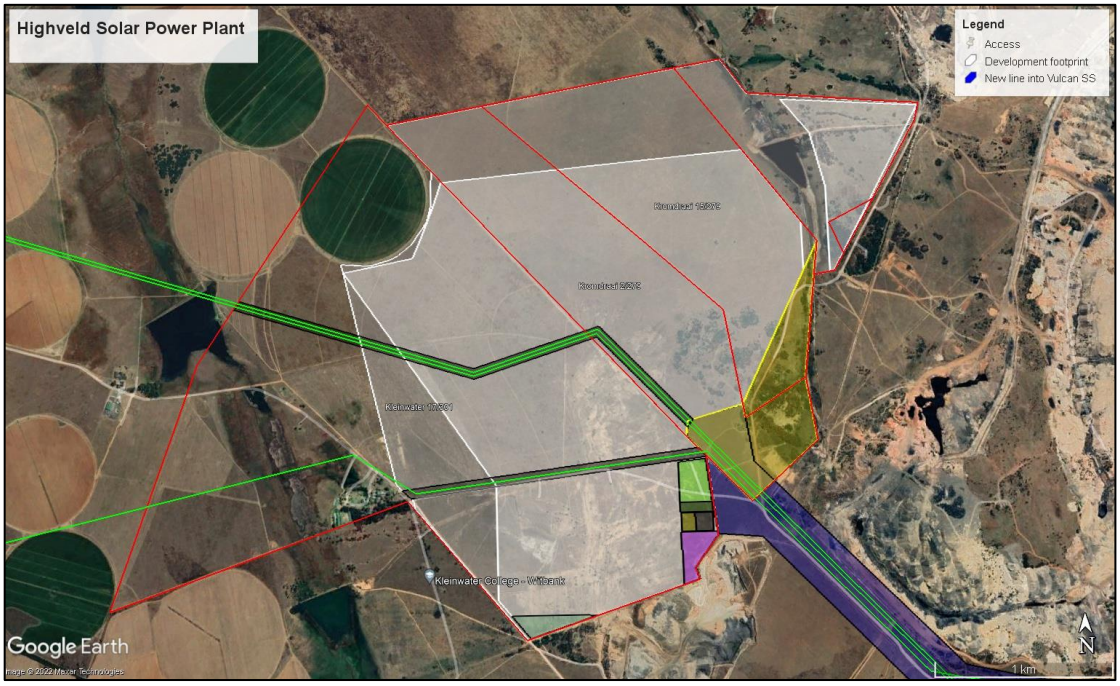


Figure 5.1: Location of the original 500ha development footprint for the Highveld Solar Power Plant development footprint.

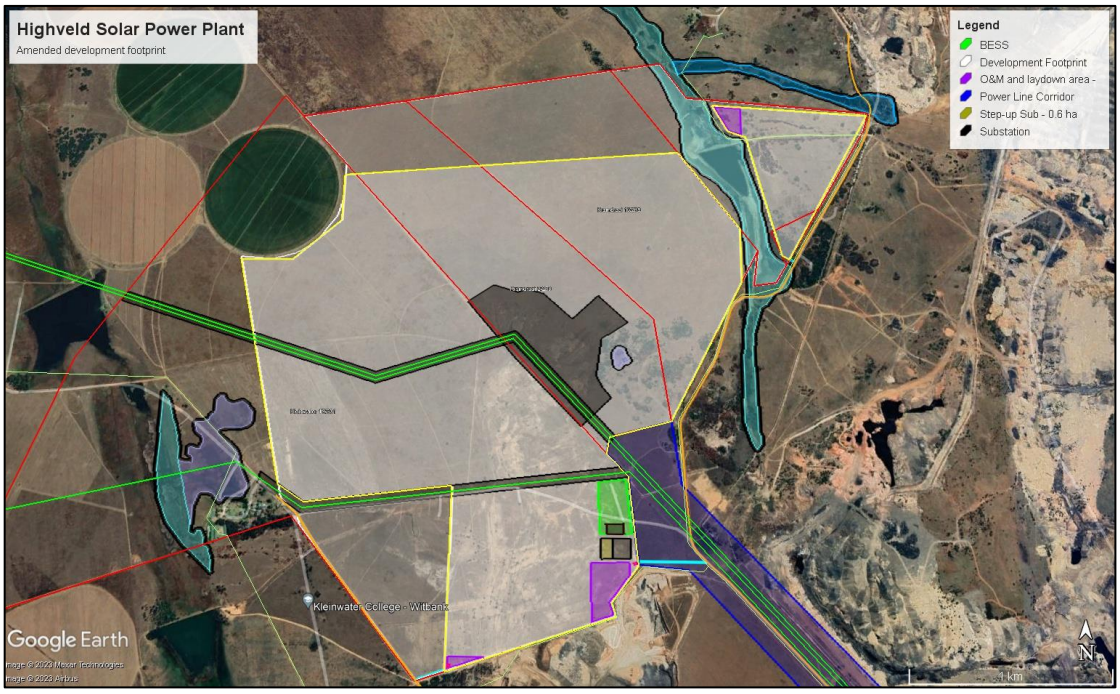


Figure 5.2: Amended 469ha development footprint for the Highveld Solar Power Plant

5.1.3 Activity alternatives

The BA 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** – Highveld Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Highveld Solar Power Plant (RF) (Pty) Ltd is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the Witbank area – refer to Figure 5.3. The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all the components can be recycled.

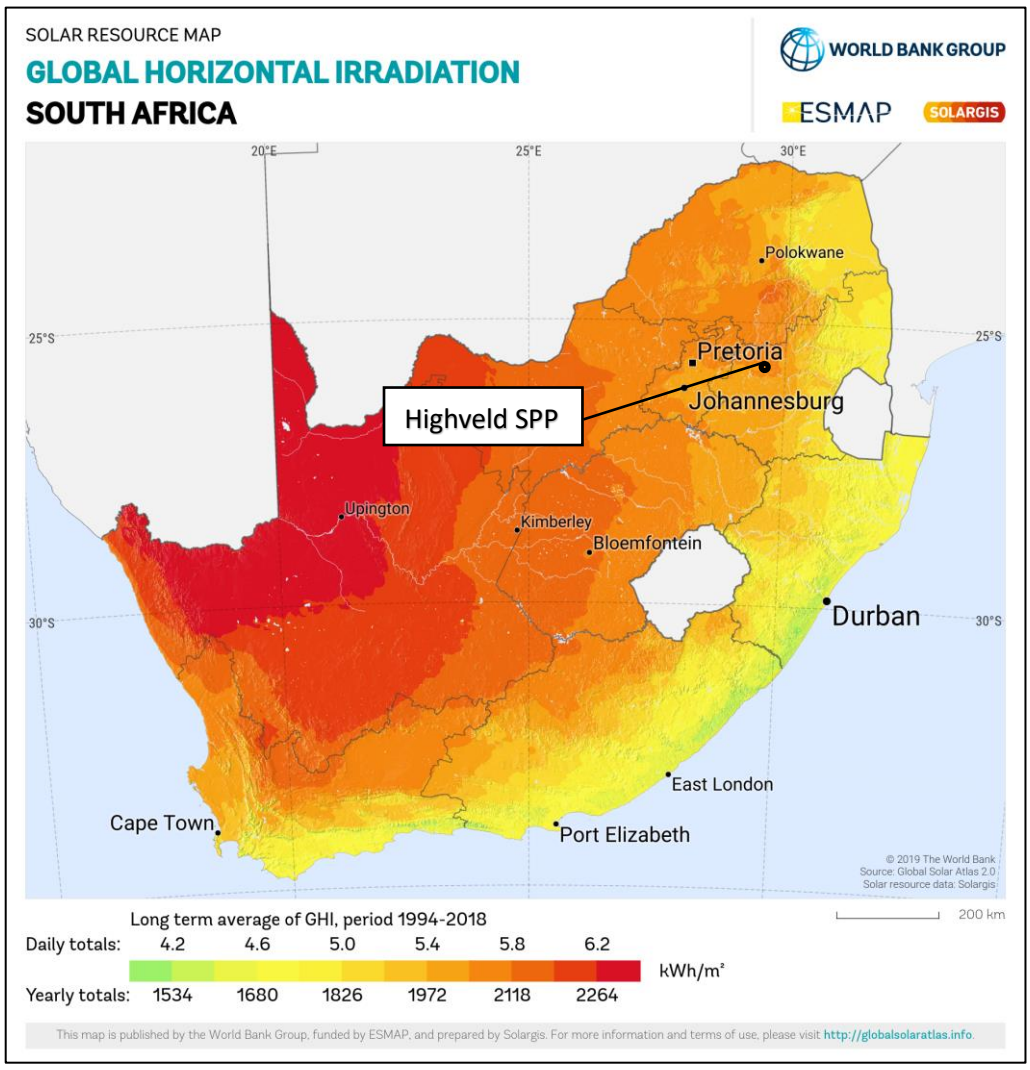


Figure 5.3: Global horizontal irradiation values for South Africa (SolarGIS, 2021) and the location of the Highveld Solar Power Plant

- **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. 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. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. Therefore, this alternative will not be considered further in this report.

5.1.4 Technical alternatives

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

5.1.4.1 Access Points

All three are considered to be required for the development as the development footprint has been split into three sections to avoid the areas under pivot irrigation and surface water features. Therefore, these access point are not considered as alternatives but rather three access points required for the development to ensure that access is available to all sections of the development footprint as a whole. Refer to Figure 5.4.

5.1.4.2 Distribution lines

Generation from the facility will tie in with the existing Eskom Vulcan 400kV MTS Substation. The connection power line will be constructed within the limits of the grid connection corridor. The grid connection corridor is located directly to the east of the SPP site. The corridor has a length of 5.3km and a width between 250 and 690m.

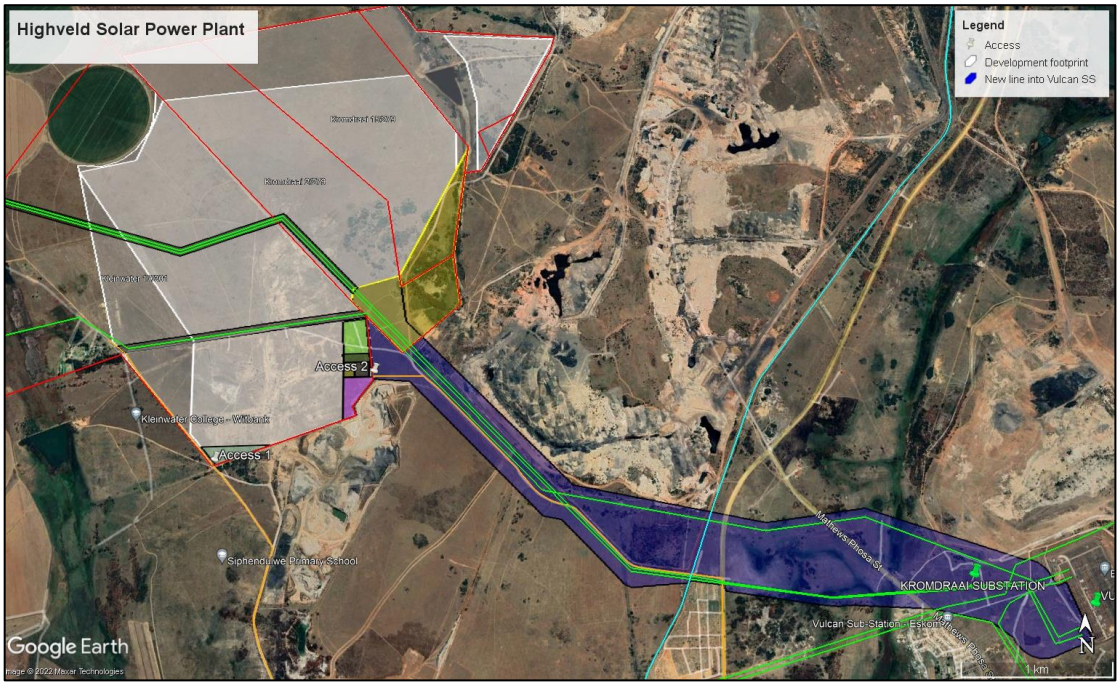


Figure 5.4: Three access points are considered to be required for the development and only one connection corridor is being considered to connect the Highveld Solar Power Plant to the grid via the existing Eskom Vulcan 400kV MTS Substation

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 the development of overhead lines is mainly based on the grounds of 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 Mpumalanga Province are unlikely to cause damage and faults on the proposed overhead transmission 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 the line can usually be put back into service within a few days. In terms of potential impacts caused by overhead transmission lines 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 because of 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.

5.1.4.3 Battery Energy Storage Facility (BESS)

It is proposed that a Battery Energy 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 1,740m^3 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. While there are various battery storage technologies available, the preferred alternative is the utility-scale Lithium-ion (Li-ion) battery energy storage. Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life (Divya KC et al., 2009).

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 baseload 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. The layout plan is included as Figures H and I of the final BAR.

The layout follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, areas under crop production through pivot irrigation, 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 and substations, 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. The choice of pylon structure does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, ecological, avifaunal and paleontological 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 power 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

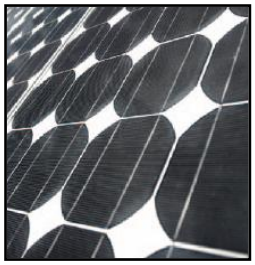
Technology alternatives for the development of a solar PV facility needs to be considered during the BA process.

5.1.6.1 Photovoltaic solar panels

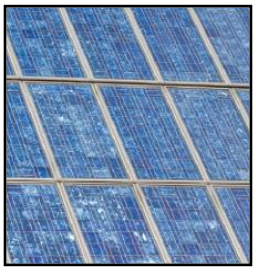
There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, thin film or bifacial PV panels. These technologies are discussed in more detail below:

- **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.



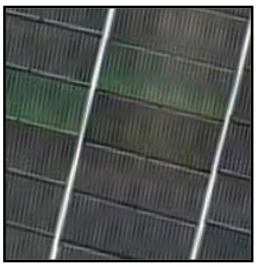
- ***Poly-crystalline Silicon*** – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive 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).

- **Bifacial panels:**

  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, 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.

  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 more 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.

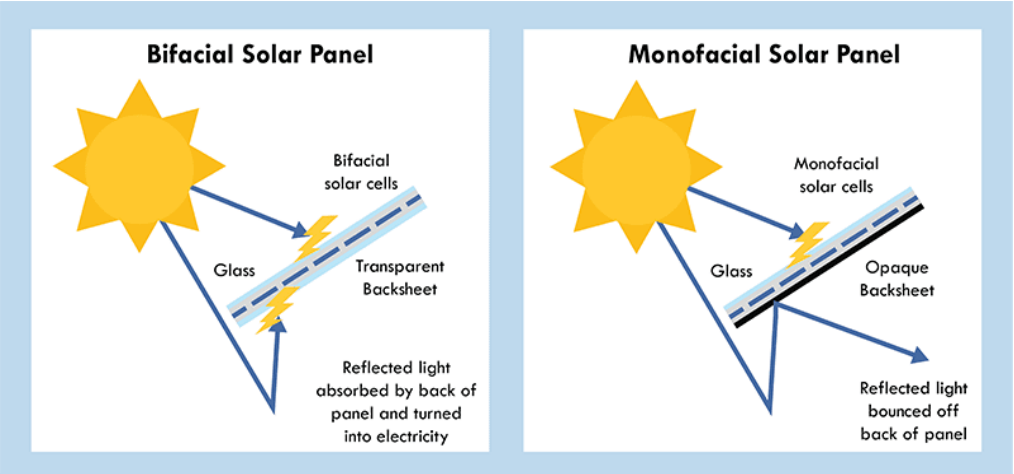


Figure 5.5: Bifacial vs Monofacial Solar Panel absorption

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
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site (i.e. used for grazing and crop production) and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

- 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 (Witbank Nuus) on the 30 September 2022 (see Appendix C1) notifying the public of the BA 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 from the placement of the advertisement.

- Site notices

  Site notices were placed on site in English and Afrikaans on 26 September 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 31 October 2022. Photographic evidence of the site notices is included in Appendix C2.

- Direct notification of identified I&APs

  Identified and registered I&APs, including key stakeholders representing various sectors, were directly informed of the Basic Assessment process via telephone calls, WhatsApps and emails (as appropriate). See Appendix C3 to this report.

- Direct notification of surrounding landowners and occupiers

  Written notices were provided via WhatsApp or email to all surrounding landowners and occupiers – refer to Figure 5.5. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C3.

➢ Circulation of Draft Basic Assessment Report

The registered I&APs were notified of the availability of the draft BAR at the commencement of the 30-day review and comment period. This included the details of where the report can be accessed. They were requested to provide their comments on the report within 30 days (06 January 2023 – 06 February 2023). All issues that are identified, raised and recorded have been documented and compiled into a Comments and Responses Report (Appendix C6) and included as part of the Final Basic Assessment Report.

➢ Circulation of decision and submission of appeals:

Notice will be given to all identified and registered I&APs of the decision taken by the DFFE. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations. In accordance with the provisions of Regulation 4(1) of Government Notice No. 993, an appellant must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered I&APs and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

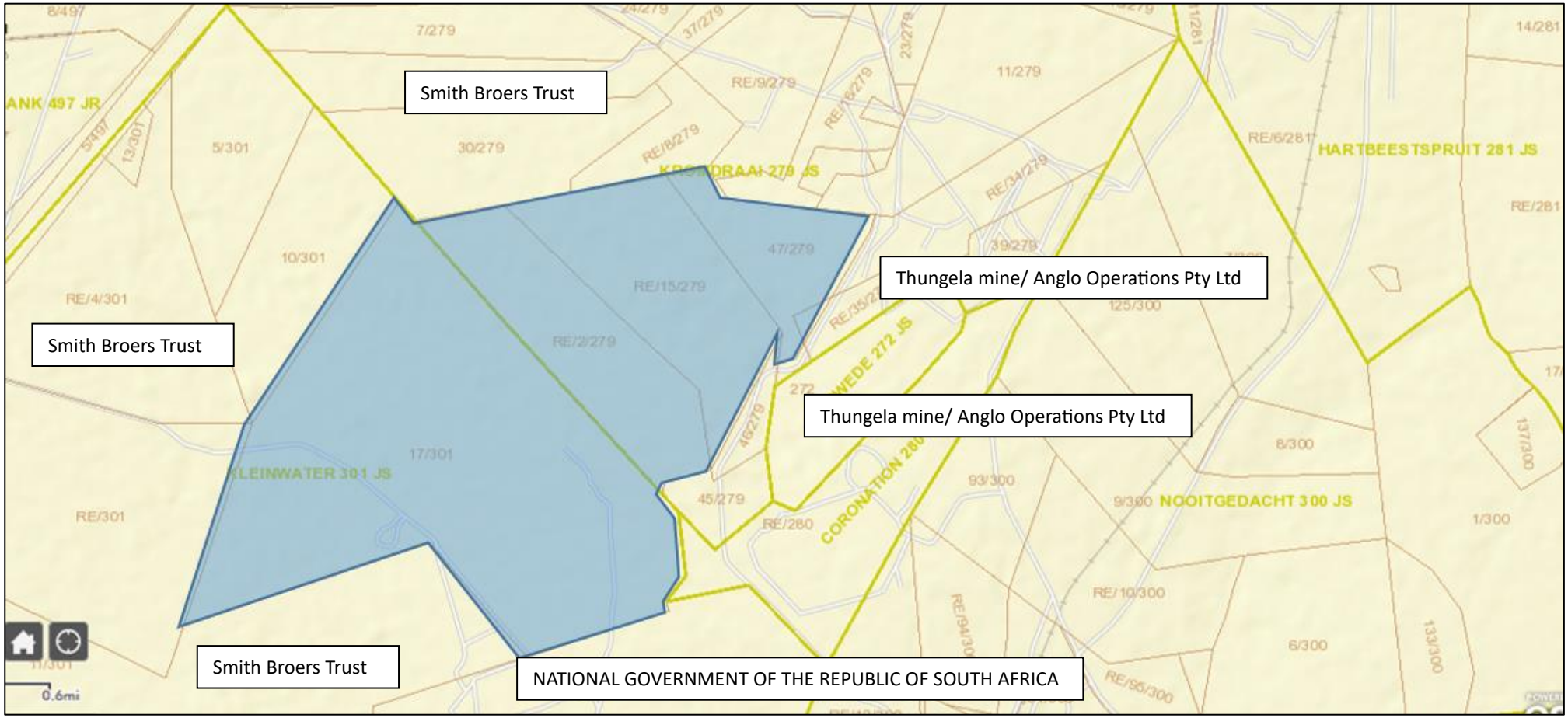


Figure 5.6: Surrounding Landowners

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 and any other party as required by the competent authority 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 C.

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*."

The Draft Basic Assessment Report which was made available to all potential and/or registered I&APs and State Departments. They were provided with a copy of the Draft BAR and were requested to provide written comments on the report within 30 days. All issues identified during this review period have been documented and compiled into a Comments and Response Report to be included as part of the Final BAR (Appendix C6).

All comments received prior to the release of the Draft BAR for the 30-day review and comment period were included in the Draft Basic Assessment report as Appendix C5 and Appendix C6 to provide I&APs an opportunity to confirm that their comments raised during the initial public participation phase have been included and considered. These comments have also been included as Appendix C5 and Appendix C6 of the Final BAR.

5.2.4 Issues raised by I&APs and consultation bodies

To date comments have been received from some consultation bodies, including the DFFE Directorate Biodiversity and Conservation and final comment from SAHRA, and is summarised in the Comments and Response Report included in Appendix C6. All comments received during the circulation of the Draft BAR have been summarised in the Final BAR. The full wording and original correspondence are included in Appendix C5 and Appendix C6.

The comments from the DFFE Directorate Biodiversity and Conservation indicated that the high sensitivity area of the "Rocky outcrop" identified by the Terrestrial Biodiversity Assessment (Appendix D1) and all demarcated wetlands (HGM 1-9), must be demarcated as a No-Go areas for the proposed development. The draft layout submitted with the Draft Basic Assessment report have been amended to comply with these comments from the directorate. An amended layout has been submitted with the Final BAR that avoids the High Sensitivity 'Rocky Outcrop' area. Refer to Figure H3 for the amended facility layout and sensitivity map and Figure I1 for the amended layout map.

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 location alternative.

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 and excludes the areas under pivot irrigation, limited sensitive areas from an ecological or conservation point have been identified. These include the close proximity of the project to the Hydrogeomorphic units, namely channelled valley bottom wetlands, hillslope seep wetlands and unchanneled valley bottom wetlands, and high sensitivity rocky outcrop. The amended layout, included as Figure I, avoids all demarcated No-go areas.

5.3.1.1 Geology, soils and agricultural potential

According to the Soil and Agricultural Assessment (Appendix D4), the following land potential level has been determined;

- Land potential level 4 (this land potential level is characterised by moderate potential. Moderately regular and/or severe to moderate limitations due to soil, slope, temperatures or rainfall. Appropriate permission is required before ploughing virgin land.
- Land potential level 5 (this land potential level is characterised by a restricted potential. Regular and/or severe limitations due to soil, slope, temperatures or rainfall.

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/Moderate to Moderate Sensitivity) and;
- Land Capability 9 to 10 (Moderate High Sensitivity).

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is predominantly covers ""Moderate High" sensitivities. Smaller patches are characterised by sensitivities with "Moderately Low" (Figure 5.7). Furthermore, various crop field boundaries were identified by means of the DEA Screening Tool (2022), which are predominantly characterised by "High" sensitivities with some few portion areas being classified as "Very High" sensitivity. It is the specialist`s opinion that these areas are no longer under cultivation and has not been cultivated in the preceding 10 years. Therefore, the Very High sensitivity rating is disputed. The high potential crop fields under pivot irrigation should be avoided for the project. The Highveld solar project and

associated Grid connection infrastructure can be rearranged around the “Very High to High” crop fields to preserve them where possible.

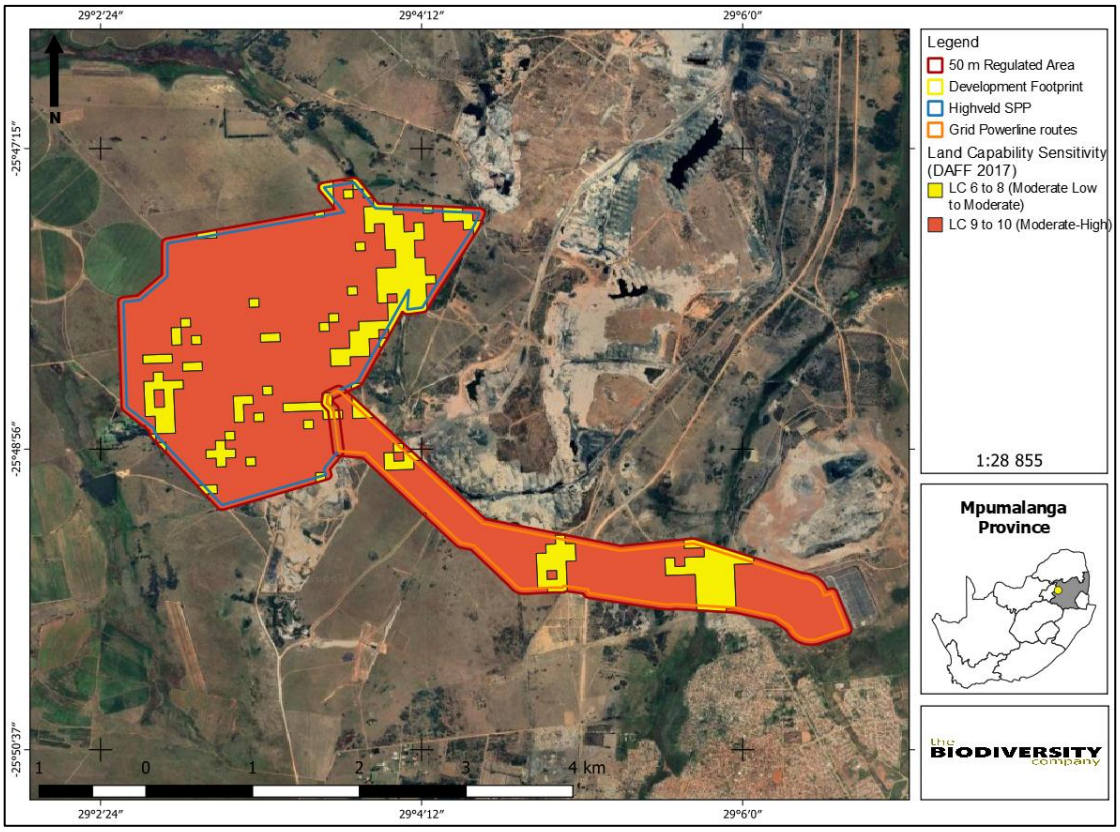


Figure 5.7: The land capability sensitivity (DAFF, 2017)

5.3.1.2 Vegetation and, topography and landscape features

According to the Terrestrial Ecology Assessment (Appendix D1), the Project Area of Influence is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Grassland Biome include:

- Summer to strong summer rainfall and winter drought; and
- Frost is common, and fog is found on the upper slopes of the Great Escarpment and seaward scarps (Mucina & Rutherford, 2006).

Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types do occur (Mucina & Rutherford, 2006).

The Grassland Biome is comprised of 4 parent bioregions and a total of 72 different vegetation types. The PAOI is situated within both the Eastern Highveld Grassland and the Rand Highveld Grassland of the Mesic Highveld Grassland Bioregion (Figure 5.8).

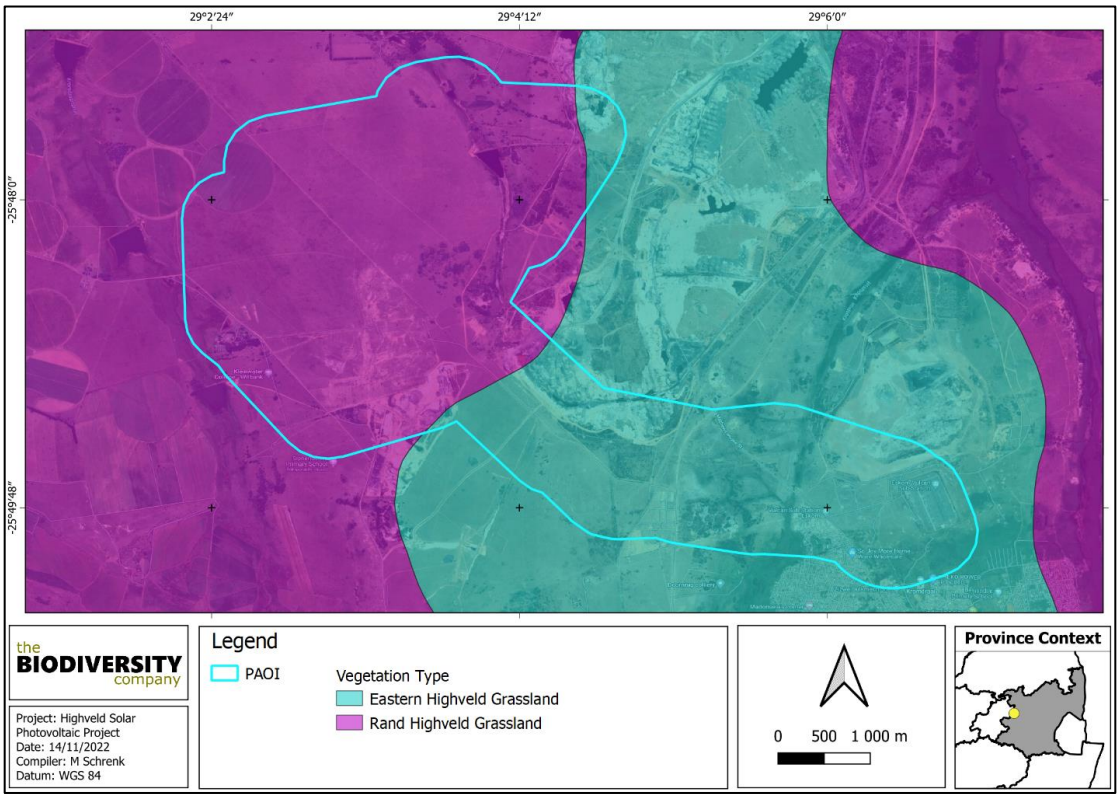


Figure 5.8: Map illustrating the vegetation types associated with the area

Ecologically Important Landscape Features

Table 5.1 presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or PAOI. 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 5.1: Summary of the spatial relevance of the PAOI to local ecologically important landscape features

Desktop Information Considered	Relevant?	Reasoning
Provincial Conservation Plan	Yes	The PAOI intercepts with terrestrial CBA and ESA areas, and Freshwater ESA areas
NBA 2018: Ecosystem Threat Status	Yes	The PAOI overlaps with 'Vulnerable' ecosystems
NBA 2018: Ecosystem Protection Level	Yes	The PAOI overlaps with 'Poorly Protected' ecosystems
National Protected Areas Expansion Strategy (NPAES)	Yes	Large priority areas for protected area expansion overlap with the PAOI
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Yes	The PAOI intercepts multiple 'Critically Endangered' wetlands
National Freshwater Ecosystem Priority Areas	Yes	The NFEPA database lists one FEPA wetland that intercepts the PAOI
Protected and Conservation Areas (SAPAD & SACAD)	No	According to the latest datasets no SAPAD or SACAD areas occur within 10 km of the PAOI
Strategic Water Source Areas	No	No Strategic Water Source Areas occur nearby, according to the 2021 dataset
Important Bird and Biodiversity Areas (IBA)	No	No IBA areas occur nearby

Provincial Conservation Plans

According to the 2014 Mpumalanga terrestrial CBA and ESA map dataset the PAOI overlaps mostly with areas classified as 'Heavily Modified' and 'Other Natural Areas', smaller portions of CBA: Irreplaceable and CBA: Optimal are also triggered (Figure 5.3). The freshwater dataset also shows that the PAOI is mostly characterised by 'Heavily Modified' and 'Other Natural Areas', with three sections of ESA: Wetlands crossing portions of the PAOI (Figure 5.8). According to MTPA (2014):

- CBA areas are areas that are required to meet biodiversity targets, for species, ecosystems or ecological processes and these must be kept in a natural state, with no further loss of habitat. Only low-impact, biodiversity-sensitive land-uses are appropriate;
- ESA areas are areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of protected areas or CBAs and for delivering ecosystem services. These must be maintained in a functional, near-natural state, but some habitat loss is acceptable. A greater range of land-uses over wider areas is appropriate, subject to an authorisation process that ensures the underlying biodiversity objectives are not compromised;
- 'Other Natural Areas' have not been identified as a priority in the current systematic biodiversity plan, but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions. Although they have not been prioritised for biodiversity, they are still an important part of the natural ecosystem; and

- 'Heavily or Moderately Modified Areas' have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets.

National Biodiversity Assessment

According to the 2018 NBA spatial dataset the PAOI overlaps with 'Vulnerable' and 'Poorly Protected' ecosystems. A 'Vulnerable' ecosystem type is one which is considered to be at a high risk of collapse, and 'Poorly Protected' ecosystems are those which have between five per cent and 50% of their biodiversity target included in one or more protected areas (SANBI, 2019).

National Protected Areas Expansion Strategy

Large portions of the PAOI overlap with NPAES priority areas for protected area expansion, as illustrated in Figure 5.9. These areas are typically important for regional conservation due to their status as important habitat or biodiversity areas and their proximity to formally protected areas or CBA's. Priority focus areas are often large portions of undeveloped natural land occurring within important ecosystem types.

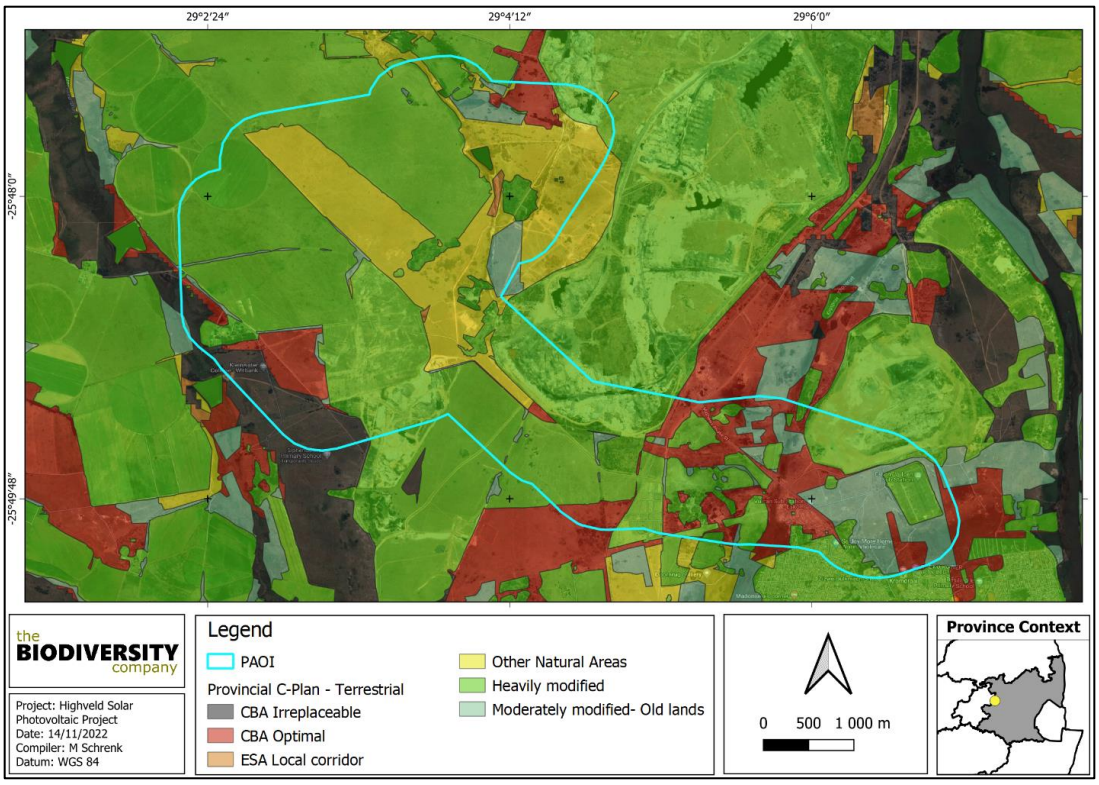


Figure 5.9: Map illustrating the Mpumalanga Terrestrial CBA and ESA map dataset relevance

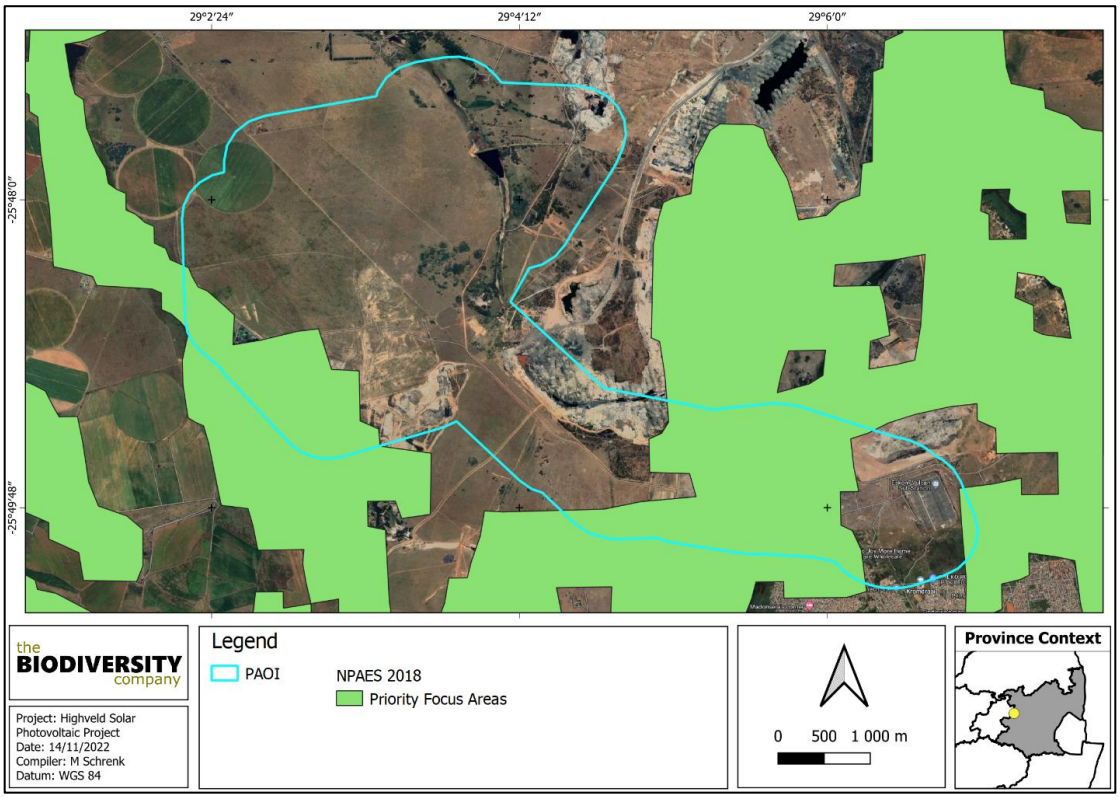


Figure 5.10: Map illustrating the PAOI location in relation to the NPAES dataset.

Indigenous flora

The PAOI was generally found to be rich in flora diversity, despite the extensive disturbances present across the landscape. The most dominant flora was that of grass, herb, and low shrub species, with the most prolific species being *Geigeria aspera* var. *aspera, Hypoxis obtusa*, *Parinari capensis* subsp. *capensis*, *Ledebouria marginata*, and the grasses *Hyparrhenia hirta* and *Cynodon dactylon*. Forty-seven (47) species of plant were noted as being prominent in the landscape – including thirty-nine (39) indigenous species and eight (8) exotics (of which six (6) are listed invasives).

No SCC flora were recorded; however, three (3) provincially protected plant species were observed (highlighted in blue below). The plants are protected as per Schedule 11 of the Mpumalanga nature Conservation act. Note: Over one hundred (100) individual *Boophone disticha* plants were recorded, and more are expected to occur within the PAOI, additionally, at least ten (10) *Protea welwitschia* individuals are expected to be found within the PAOI. For this reason, it is recommended that a plant search and rescue plan be developed and implemented prior to the commencement of site clearing – and this must include an application for the appropriate permit.

Figure 5.11: Photographs illustrating some of the indigenous flora species recorded – A) *Boophone disticha* (protected); B) *Protea welwitschii* (protected); C) *Crinum graminicola* (protected); and D) *Ledebouria ovatifolia*

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.

Six (6) IAP species were recorded during the field survey, four (4) of which are Category 1b species which must be controlled through the implementation of an IAP Management Programme. The common weed *Tagetes minuta* was also observed invading certain sections. Most of the IAP invasion was confined to the proposed grid area, with only some minor invasion of *Solanum sisymbriifolium* noted within the proposed PV footprint. Dense and extensive stands of *Acacia dealbata* were observed in numerous sections. Photographs of some the observed IAP species are presented in Figure 5.12.

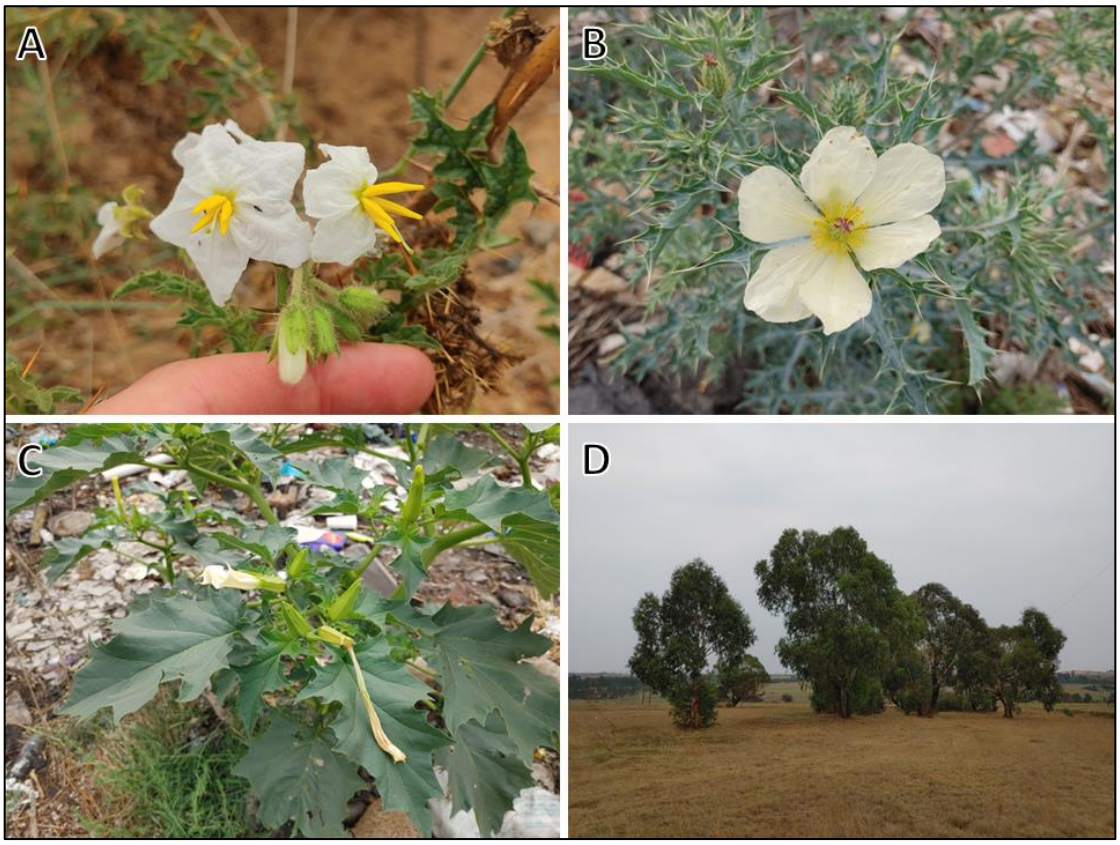


Figure 5.12: Photographs illustrating some of the listed IAP flora species recorded within the Project Area of Influence – A) *Solanum sisymbriifolium*; B) *Argemone ochroleuca*; C) *Datura stramonium*; and D) *Eucalyptus camaldulensis*

Habitat Assessment

The main habitat types identified across the Project Area of Influence were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Six (6) habitats were delineated in total, and these are mapped over the entire PAOI in Figure 5.13 below.

Emphasis was placed on limiting timed meander searches to within the most functional habitats, and therefore habitats with a higher potential of hosting SCC. It is noted that the Modified Grassland habitat closely coincides with the regional historical vegetation types as described by Mucina & Rutherford (2006).

The six habitats have been summarised in table 5.2 below.

Table 5.2: Summary of habitat types delineated within the Project Area of Influence

Habitat Type	Description	Dominant Flora	Habitat Sensitivity
Transformed	Portions of land with very little to no indigenous vegetation remaining, such as roads and township development.	Exotic weeds and invasives such as *Solanum spp.* and *Tagetes minuta*.	Very Low

Critically Modified Grassland	Gently undulating open grassland habitat of a low functionality, impacted by overgrazing and the edge effects of development activities.	*Hyparrhenia hirta* and *Cynodon dactylon grasses* with some dominant populations of several indigenous herbs.	Low
Modified Grassland	Gently undulating open grassland habitat with some functionality and a higher diversity and density of flora species than the Critically Modified Grassland areas.	Diversity of grasses. Diversity of herbs and low shrubs such as *Elephantorrhiza elephantina, Geigeria aspera* var. *aspera, and Hypoxis obtusa.*	Medium
Secondary Water Resource	Significantly impacted permanently to seasonally wet portions of land as delineated by the wetland specialist.	Low diversity of sedge species, and some reeds typical of wet areas.	Medium
Primary Water Resource	Interconnected and important permanently to seasonally wet portions of land as delineated by the wetland specialist. Important foraging resource for local fauna.	Diversity of sedge and reed species, and some habitat specialist flora such as *Dierama mossii*.	High
Rocky Outcrops	Isolated sections of rocky outcrops that serve as important micro-habitat for unique flora and fauna.	Species found in the Modified Grassland habitat, as well as some habitat specialists such as *Pellaea calomelanos*.	Medium

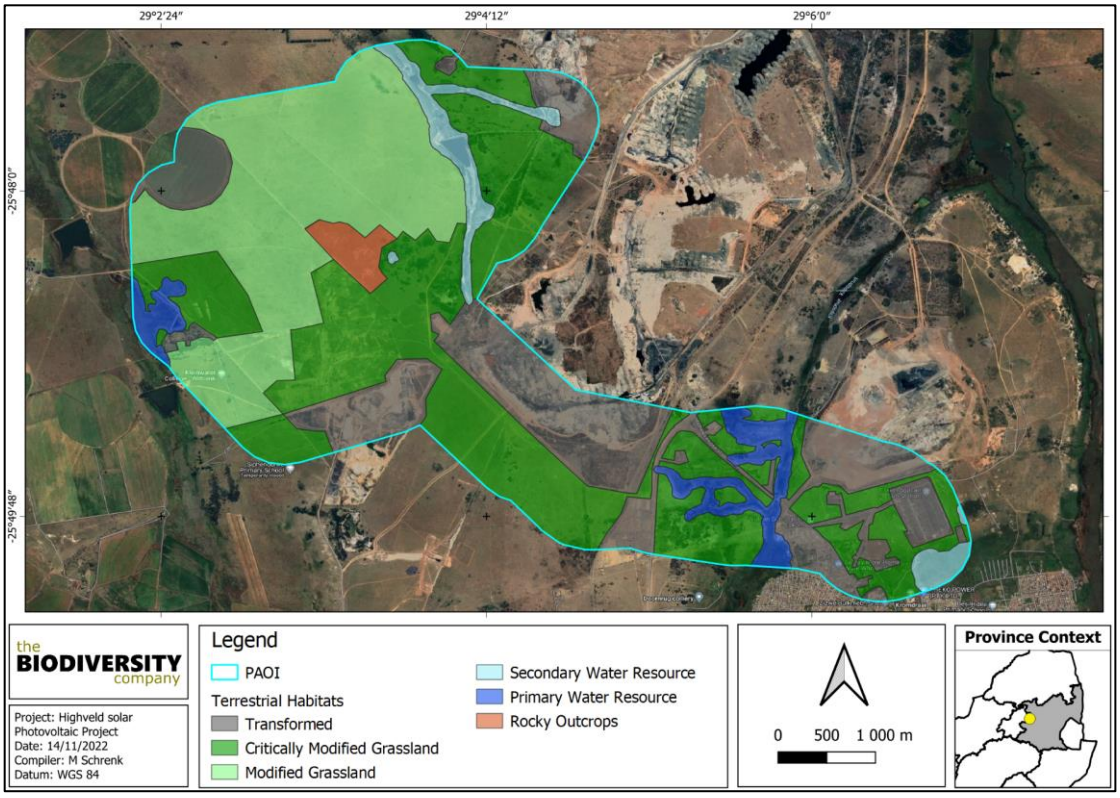


Figure 5.13: Map illustrating the habitats identified in the Project Area of Influence

5.3.1.3 Wetland Assessment

According to the Wetland Baseline and Risk Assessment (Appendix D1), the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 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). Two wetland types were identified by means of this data set. The wetlands are classified as being channelled valley bottoms and hillslope seeps respectively. The channelled valley bottoms conditions were classified as being a C (Moderately Modified) and the hillslope seep was classified as being a D/E/F (Critically Modified (refer to Figure 5.13).

National Freshwater Ecosystem Priority Areas (NFEPA)

Three wetland types have been identified within the project area of influence, namely multiple channelled valley bottom wetlands, three wetland flats and an unchanneled valley bottom wetland (see Figure 5.13).

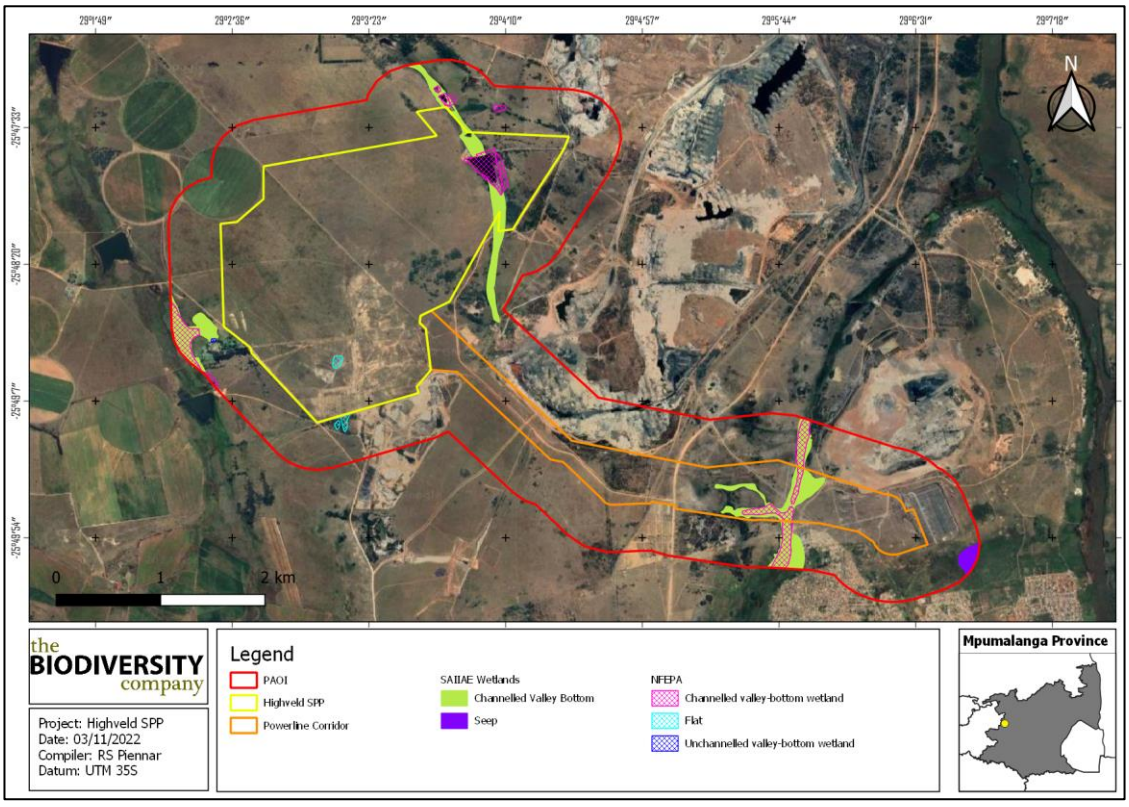


Figure 5.14: SAIIAE and NFEPA wetlands located within PAOI

Delineation and Description of wetlands in the PAOI

During the site visit, nine HGM units were identified within the PAOI (see Figure 5.15). The wetland areas were delineated in accordance with the DWAF (2005) guidelines. HGM units have been classified as three channelled valley bottoms, three unchanneled valley bottoms and three hillslope seep wetlands. Multiple artificial wetlands, namely dams and drainage features were identified to the within the PAOI. According to Ollis et al (2013) a dam is classified as 'an artificial body of water formed by the unnatural accumulation of water behind an artificial barrier that has been constructed across a river channel or an unchannelled valley

bottom wetland'. Although these systems do not classify as a natural wetland system it is important to note where the dams are for any planned development in the area. The delineation of the wetland systems and functional assessment have been completed for the unchanneled valley bottom wetlands in which the dams are located.

Drainage features (or lines) were also identified for the eastern catchment the PAOI. These features are referred to as 'A' Section channels that convey surface runoff immediately after a storm event and are not associated with a baseflow (DWAF, 2005). Refer to Figure 5.16 for delineated features in the PAOI.

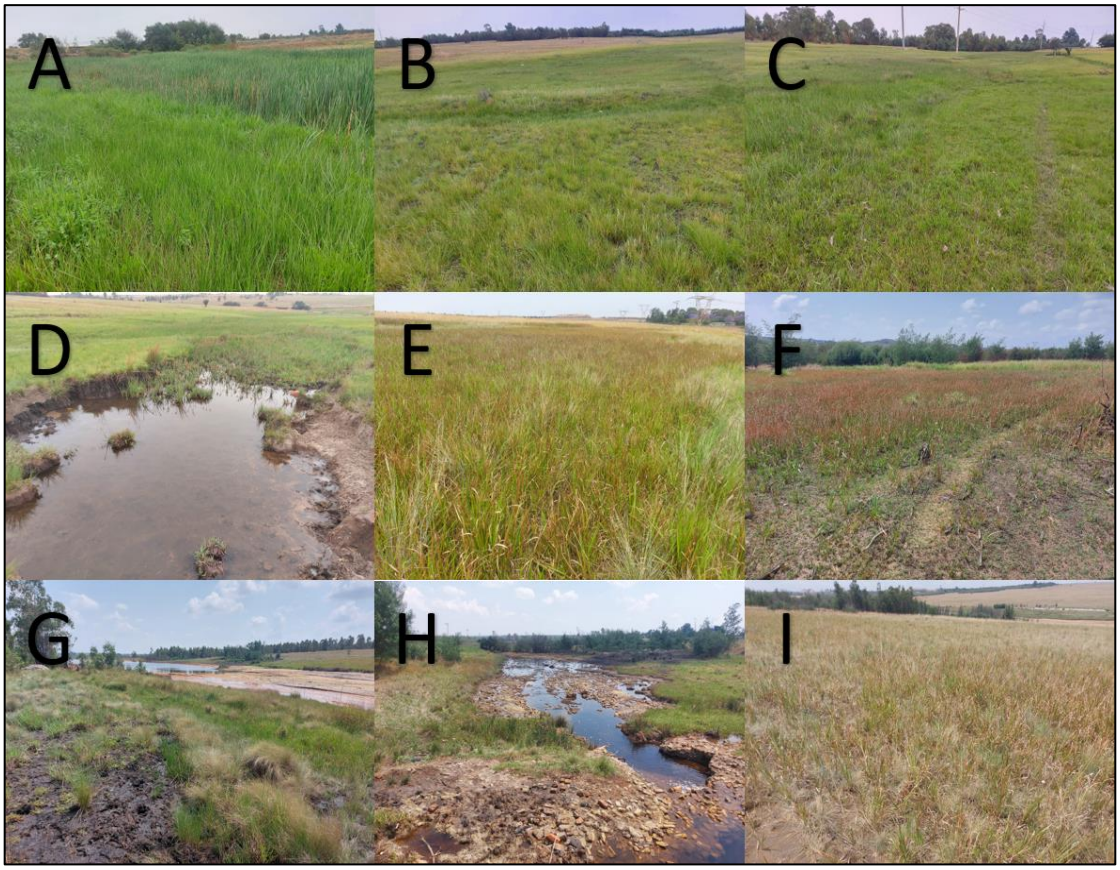


Figure 5.15: Photographical evidence of the different wetland types found within the project area of influence, A) Channelled valley bottom, B, C & D) Unchannelled valley bottom wetlands, E & F) Hillslope Seep, G & H) Channelled Valley bottom wetlands and I) Hillslope seep wetland.

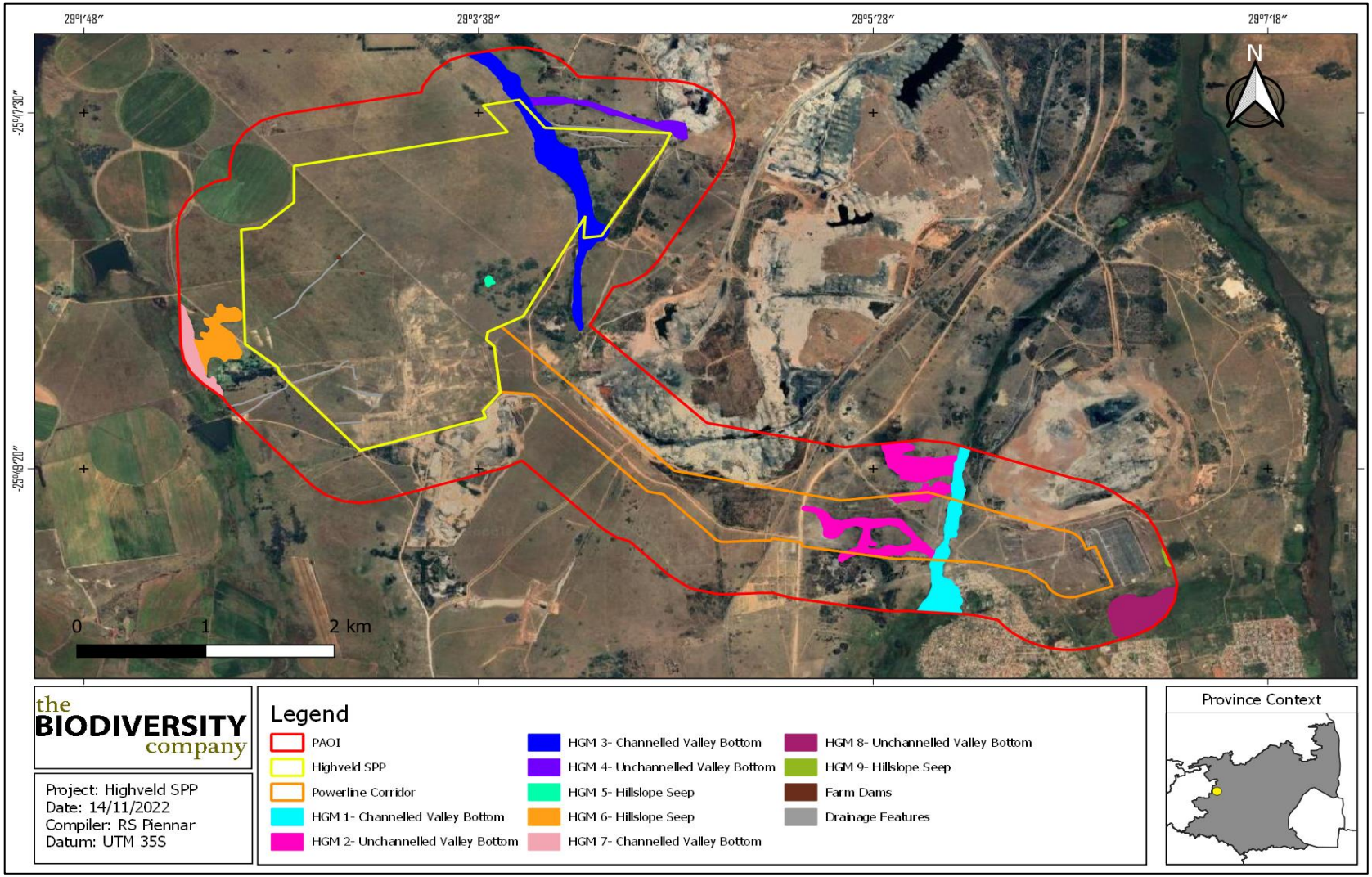


Figure 5.16: Delineation and location of the different HGM units identified within the PAOI

5.3.1.4 Climate

The Gm 11 and 12 vegetation types is characterised by is characterised by a summer rainfall with a mean annual precipitation of 654 mm which is slightly lower in the western parts of this vegetation type (Figure 5.17). These areas are known to have warm-temperate conditions with dry winters. The likelihood of frost however is greater in the western parts with the incidence of frost ranging from 30 to 40 days compared to the east which has a frost incidence of 10 to 35 days. This vegetation type is also classified as endangered even though very little conservation has been done for this vegetation type.

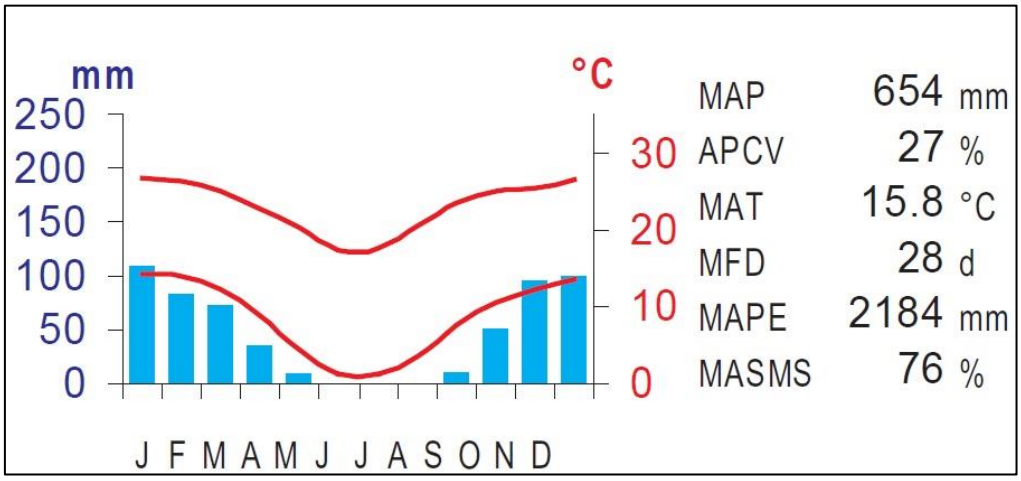


Figure 5.17: Climate diagram representative of the Highveld Solar Power Plant (Mucina & Rutherford, 2007)

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 Avifaunal Impact Assessment (Appendix D2) during the assessment performed in the summer (7^{th} – 9^{th} of October 2022) 99 species were recorded during the point counts and 4 additional species during the incidental counts. The total number of individual species accounts for approximately 36% of the total number of expected species. The disturbed nature of the project area and surrounds is most likely a contributing factor to the numbers recorded. One of the species recorded was an SCC, the African Marsh Harrier (*Circus ranivorus*) was recorded along the Klipspruit River just outside of the PAOI (Figure 5.18 and 5.19). The overall state of the river appeared to be somewhat modified but overall, in a healthy state based on the diversity of water fowl observed.

Figure 5.18: The African Marsh Harrier recorded in the assessment

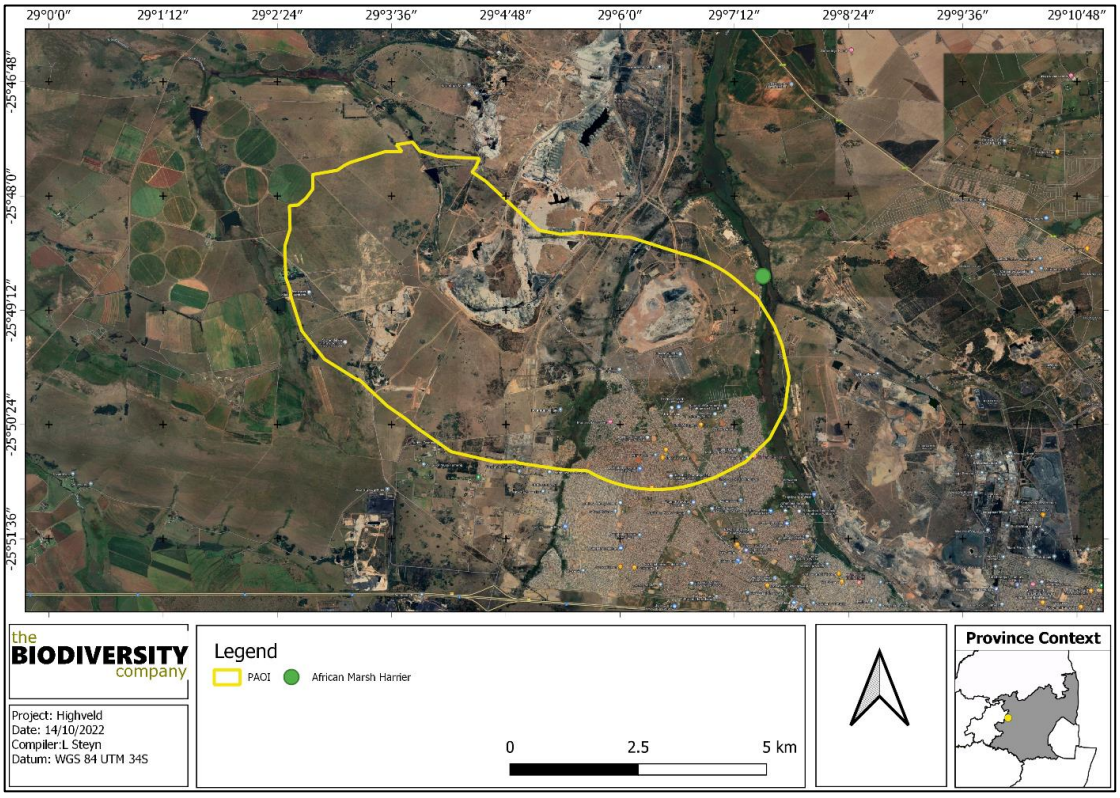


Figure 5.19: Location of the African Marsh Harrier sighting

Priority Species

'Priority Species' are those avifauna that are particularly susceptible to energy developments, and although these priority species were developed for Wind Energy developments (Ralston Paton et al, 2017), the type of impact is congruent with solar energy facilities, i.e., collision, electrocution, and habitat loss. The priority species influenced by the powerlines as per the Eskom and EWT birds and powerline (2015) poster were also considered. Even though the panels may not pose an extensive collision risk for larger avifauna species, powerlines associated with the infrastructure, guidelines (anchor lines) and connection lines do pose a risk. The fence could also pose a collision risk for various species. Eleven of the species observed within the PAOI are regarded as priority species (Table 5.3).

Table 5.3: Summary of Priority Species recorded within and around the proposed Highveld Solar PV

Scientific Name	Common Name	Collisions	Electrocutions	Habitats Loss
Spur-winged Goose	*Plectropterus gambensis*	x		
Egyptian Goose	*Alopochen aegyptiaca*	x	x	
Reed Cormorant	*Microcarbo africanus*		x	
Pied Crow	*Corvus albus*		x	
Black-headed Heron	*Ardea melanocephala*	x	x	
African Marsh Harrier	*Circus ranivorus*	x	x	x
African Sacred Ibis	*Threskiornis aethiopicus*		x	
Purple Heron	*Ardea purpurea*	x	x	
Black Sparrowhawk	*Accipiter melanoleucus*		x	
Greater Kestrel	*Falco rupicoloides*		x	x
Northern Black Korhaan	*Afrotis afraoides*	x		

Dominant Species

Twenty-seven of the recorded species accounted for more than 72% of the total number of individuals recorded. The most abundant species was *Quelea quelea* (Red-billed Quelea) with a relative abundance of 0.18 and a frequency of occurrence of 1.9%. Additional ubiquitous species comprised of *Ploceus velatus* (Southern Masked Weaver) and *Streptopelia capicola* (Cape Turtle Dove), with a frequency of occurrence of 53.8% and 42.3%, respectively.

Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. Although species to tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivorous birds that feed on the ground during the day (IGD). Followed by Granivores (GGD) and Omnivores (OMD).

Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure.

No dominant flight directions were observed in the assessment, nests of priority species or SCC were also not recorded in the survey.

Fauna

According to the Terrestrial Ecology Assessment (Appendix D1), mammal activity during the survey was good, particularly within the proposed PV area as this section is managed as an informal reserve. Ten (10) mammal species were recorded (Table 5.4), and one (1) herpetofauna species was observed during the survey (Table 5.5).

One fauna SCC was recorded, the internationally 'Near Threatened' Equus quagga (Plains Zebra), this species is however relatively abundant in Southern Africa and its presence is of little concern to the proposed project.

A larger number of mammal and herpetofauna species are expected to occur in the area, and longer-term multi-season surveys would be required in order to ensure sufficient sampling.

Refer to Figure 5.20 for photographs of some of the recorded fauna species.

Table 5.4: The mammal species recorded during the field survey

Species	Common Name	Conservation Status	
		SANBI (2022)	IUCN (2021)
Antidorcas marsupialis	Springbok	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Damaliscus pygargus phillipsi	Blesbok	LC	LC
Equus quagga	Plains Zebra	LC	NT
Geosciurus inauris	South African ground squirrel	LC	LC
Lepus saxatilis	Scrub Hare	LC	LC
Phacochoerus africanus	Common Warthog	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Redunca arundinum	Southern Reedbuck	LC	LC
Tragelaphus oryx	Common Eland	LC	LC

Table 5.5: The herpetofauna species recorded during the field survey

Species	Common Name	Conservation Status

		SANBI (2022)	IUCN (2021)
Schismaderma carens	Red Toad	LC	LC

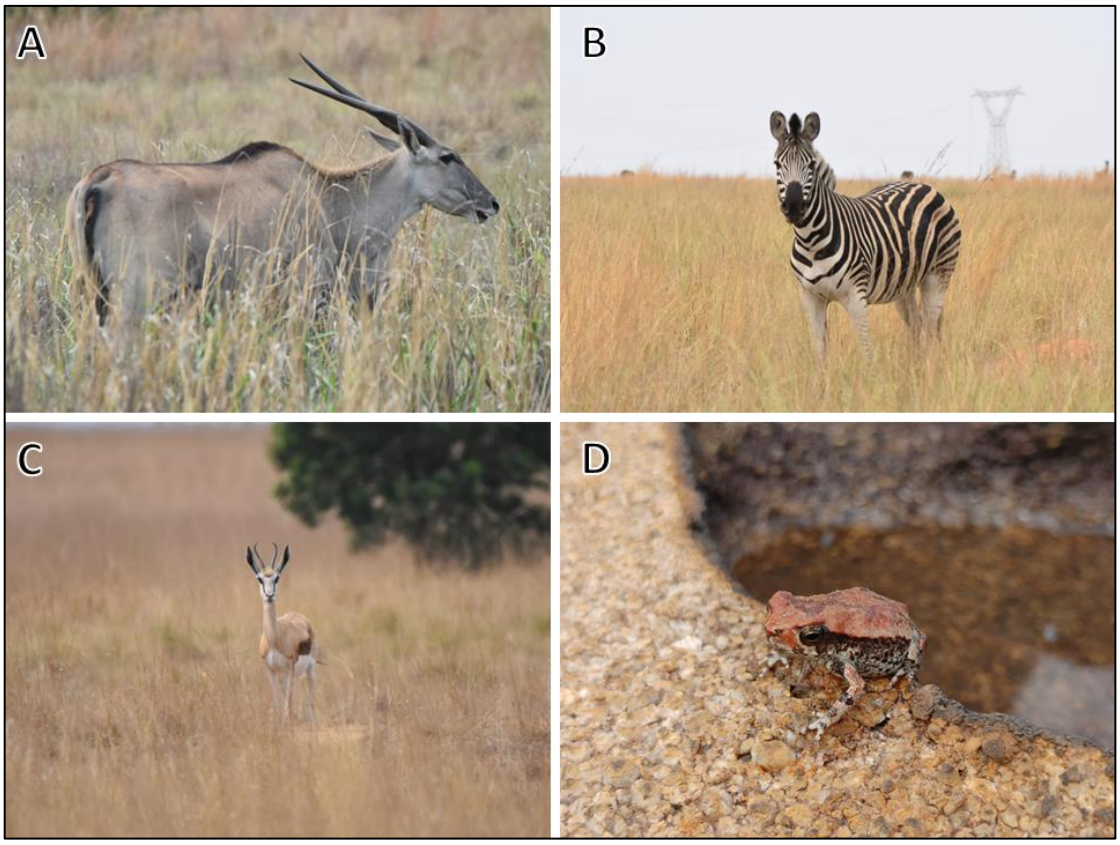


Figure 5.20: Photographs: Fauna species recorded during the survey – A) *Tragelaphus oryx* (Common Eland); B) *Equus quagga* (Plains Zebra); C) *Antidorcas marsupialis* (Springbok); and D) *Schismaderma carens* (Red Toad)

5.3.1.6 Visual landscape

According to the Visual Impact Assessment (Appendix D3), 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 Solar Power Plant (SPP) is located in an area with relatively low significance in elevation, meaning that the site is not located on a mountain, at the foot of a mountain or in an area with a significant difference in elevation. The area around the site can be describes as undulating landform formations with spikes in elevation at mining sites. However, the difference in elevation of the project site itself is approximately 89m from the highest to the lowest amsl. The SPP is located at an above mean sea level (amsl) of approximately 1527m at

the highest elevation and at an amsl of 1438m at the lowest elevation. The SPP drains towards the north east.

The area description above also applies to the power line. The power line is located at an above mean sea level (amsl) of approximately 1533m at the highest elevation and at an amsl of 1460m (stream crossing) at the lowest elevation. The PL drains towards the west.

The landform and drainage described above is likely to limit visibility due the undulating landforms in the area together with existing mining activities. The ZTV Section (Section 5) of this report will reflect the theoretical visibility.

Sensitive Visual Receptors

Visual Receptors can be defined as: "Individuals, groups or communities who are subject to the visual influence of a particular project."

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 5.6 and Table 5.7 below reflects the visibility rating in terms of proximity on sensitive receptors of the SPP and PL. Figures 5.21 and 5.21 reflects the theoretical visibility. The distances were calculated according to experience, assumptions and opinion. The ZTV maps will give a clearer understanding of areas susceptible to line of sight of the SPP and PL.

Table 5.6: ZTV Visibility Rating in terms of Proximity to the SPP.

Radius	**Visual Receptors**	**Visibility rating in terms of proximity**
0-1km	- One homestead on a farm. **Coverage: 82.9%**	Very High
1-3km	- Two homesteads on farms. **Coverage: 51.9%**	High
3-5km	- Two homesteads on farms. **Coverage: 14.7%**	Medium
5-10km	- 23 homesteads on farms. - One lodging facility. - One cluster smallholdings.	Low

	Coverage: 14.3%	

Table 5.7: ZTV Visibility Rating in terms of Proximity to the Power Line.

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- Two homesteads on farms. **Coverage: 96.6%**	Very High
1-3km	- 12 homesteads on farms. - Kwa-Guqa. **Coverage: 68.1%**	High
3-5km	- 13 homesteads on farms. - Kwa-Guqa. - N4 National Road. **Coverage: 60.5%**	Medium
5-10km	- 32 homesteads on farms. - One lodging facility. - N4 National Road. - R547 regional road. - R544 regional road. - Ackerville. - Clewer. **Coverage: 24.8%**	Low

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.

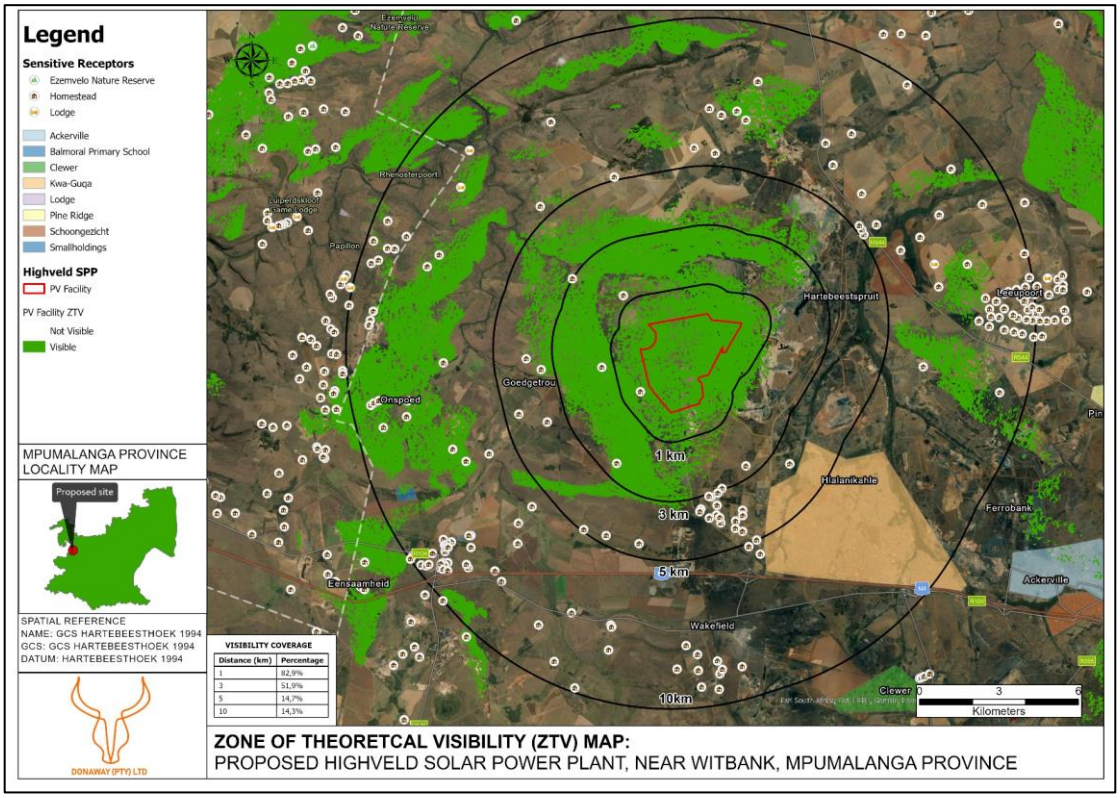


Figure 5.21: Zone of Theoretical Visibility (ZTV) for the Highveld Solar Power Plant.

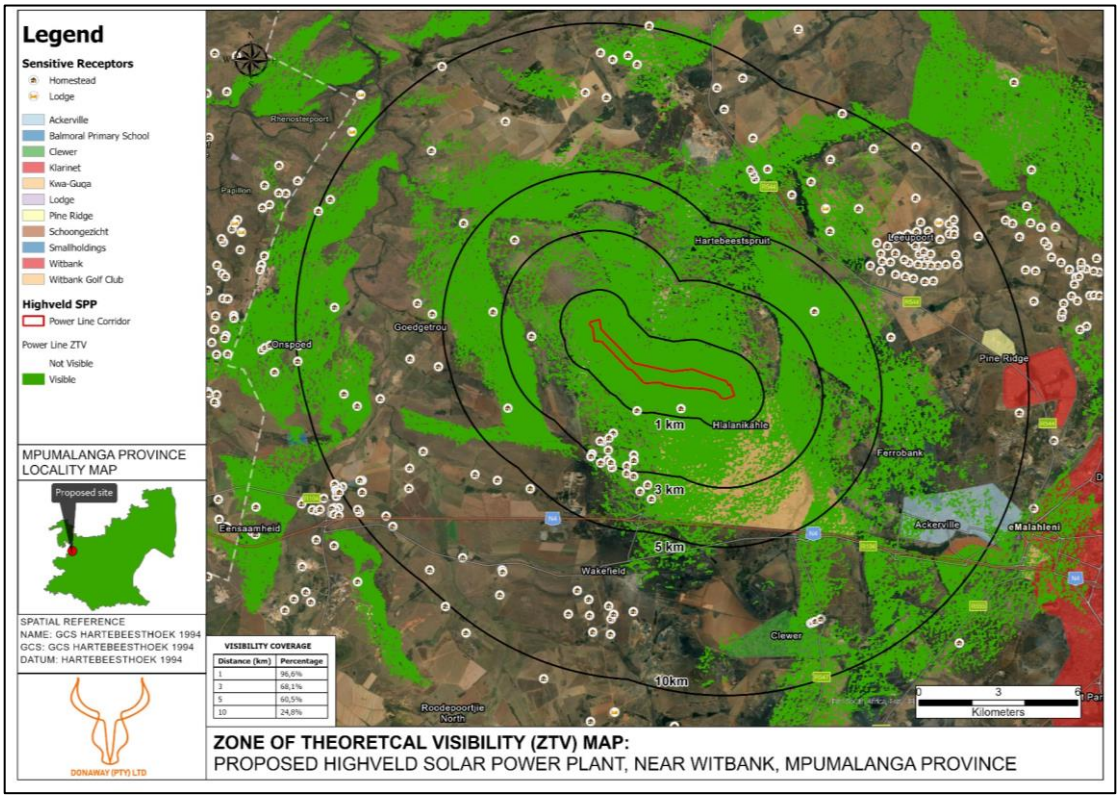


Figure 5.22: Zone of Theoretical Visibility (ZTV) for the proposed grid corridor.

5.3.1.7 Traffic consideration

According to the Traffic Impact Study (Appendix D8), the proposed site accesses follow existing gravel roads and have been assessed in line with access spacing requirements, required sight lines and road safety considerations. To reach Access point 1, the route leaves the main unsurfaced road from the N4 after approximately 400 m. Site vehicles will turn left to follow this road to Access point 1 for another 6 kms past a sand mine. Besides some vegetation requiring cutting back for acceptable sight lines, it is expected that this road will be suitable for larger construction vehicles.

However, due to sharing this road with a sand mine being located to the south of the Highveld Solar site, it is recommended to establish a delivery schedule, taking the peak periods of the sand mine into account.

Access road 2 will turn left from the main gravel road towards Access point 2 after approximately 4.5 kms travel distance from the N4 off-ramp (see Figure 4-2) .

The existing unsurfaced road leading towards the site and Access 2. If this access road is chosen as a secondary access during the construction phase, then two factors need to be considered:

- The road towards Access 2 will pass the Empumelelweni township. To reduce the development's impact during the construction phase from a noise and dust pollution perspective, the road surface on the section past Empumelelweni would either need to be kept moist or be surfaced.

- Furthermore, road safety measures will need to be in place along this section, to alert residents of construction vehicles using this road (i.e., temporary road signage, informing residents of construction period, creating speed humps along the road to reduce speeds of construction vehicles).The gravel road towards Access road 2 passes a railway line 500 m from the N4. If this road will be used for the construction period, it needs to be established before start of construction if this railway line is still in operation.

A formal application for the recommended access points will need to be lodged with the eMalahleni Local Municipality and the Mpumalanga Department: Police, Roads and Transport. The formalisation of this access point to the standard, will in all probability be a requirement as part of the wayleave approval.

An internal site road network will also be required to provide access to the solar field and associated infrastructure. It is anticipated that approximately 15 km of internal roads will be required for the facility.

The construction and decommissioning phases of a solar PV facilities are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is of temporary nature, i.e., the impact of the solar PV facility on external traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

From a transport engineering perspective, the proposed development alternatives (i.e., electrical infrastructure compound location alternatives and the technology options for the BESS) are acceptable as they do not have any impact on the traffic on the surrounding road network.

The proposed access points to the proposed Highveld Solar PV site have been assessed from a traffic engineering perspective and was found to be acceptable.

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

According to the Social Impact Assessment (Appendix D7) Mpumalanga, the second-smallest province in South Africa after Gauteng, is located in the north-eastern part of the country, bordering Swaziland and Mozambique to the east. It also borders Limpopo, Gauteng, Free State and KwaZulu-Natal within South Africa. It covers an area of 76 495km² and has a population of 4 335 964, making it the sixth most populous in the country. It is situated mainly on the high plateau grasslands of the Middleveld, which roll eastwards for hundreds of kilometres. In the north-east, it rises towards mountain peaks and terminates in an immense escarpment. In some places, this escarpment plunges hundreds of metres down to the low-lying area known as the Lowveld.

The Nkangala District Municipality is a Category C municipality in the Mpumalanga Province. It is the smallest district of the three in the province, making up 22% of its geographical area. It is comprised of six local municipalities: Victor Khanye, Emalahleni, Steve Tshwete, Emakhazeni, Thembisile Hani, and Dr JS Moroka. The district's headquarters are in Middelburg.

Nkangala is at the economic hub of Mpumalanga and is rich in minerals and natural resources. A strength of the district is the Maputo Corridor, which brings increased potential for economic growth and tourism development.

The proximity to Gauteng opens up opportunities to a larger market, which is of benefit to the district's agricultural and manufacturing sectors. The further potential inherent in exporting goods provides opportunities that need to be investigated.

The total area of the DM is 16 758km² and it consists of the following towns: Delmas, Dullstroom, Emgwenya (Waterval Boven), Hendrina, Kriel, KwaMhlanga, Mdala Nature Reserve, Middelburg, Ogies, Phola, Pullens Hope, Rietkuil, eMakhazeni, Emalahleni, eNtokozweni (Machadodorp). The main economy sectors are mining, manufacturing, energy, tourism and agriculture.

The Emalahleni Local Municipality is a Category B municipality situated in the Mpumalanga Province within the Nkangala District. It forms part of the western regions of the province and borders onto the Gauteng Province. Thembisile Hani and Victor Khanye, and City of Tshwane Metro in Gauteng, border the municipality to the north and west. The Gert Sibande District

borders it to the south and Steve Tshwete is located to the east. It is one of six municipalities in the district.

The Emalahleni Municipality is strategically located in terms of the provincial context and transport network. It is situated in close proximity to the City of Ekurhuleni, City of Johannesburg and City of Tshwane Metropolitan Municipalities in Gauteng and is connected to these areas by the N4 and N12 freeways. These freeways converge at eMalahleni (previously Witbank), from where the N4 extends to Mbombela (previously Nelspruit), the provincial capital, and ultimately Maputo in Mozambique. The N4 freeway, along with the railway line that runs adjacent to the freeway from Gauteng to Mozambique, constitute the Maputo Corridor.

The southern areas of the Emalahleni Municipality form part of the region referred to as the Energy Mecca of South Africa, due to its rich deposits of coal reserves and power stations. Emalahleni and Middelburg (situated in the adjacent Steve Tshwete Municipality) are the highest order settlements in the Nkangala District. These towns offer the full spectrum of business and social activities, and both towns have large industrial areas. The towns fulfil the function of service centres to the smaller towns and settlements, as well as farms in the district.

Th LM covers an area of 2 678km² and the following town can be found in this area: Kriel, Ogies, Phola, Witbank.

The main economic sectors in the municipality are Mining, power generation, steel, vanadium and chrome.

5.3.2.2 Cultural and heritage aspects

According to the Heritage Impact Assessment (Appendix D5) special attention was given to the identification of possible cultural or heritage resources on site.

Stone Age

Very little habitation of the highveld area took take place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River, or in sheltered areas such as the Magaliesberg. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. The MSA is a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. Open sites were still preferred near watercourses. These people were adept at exploiting the huge herds of animals that passed through the area, on their seasonal migration.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the region. These vary from sealed (i.e. cave) sites, located to the north and south of the study area, to open sites in the Magaliesberg. Also, for the first time we get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small, bored stones and wood fragments with incised markings are

traditionally linked with the LSA. The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes.

Figure 5.23: Small rock shelter occupied during the Later Stone Age, southwest of the project area

Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area. Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and the Mpumalanga highveld.

This wet period came to a sudden end sometime between 1800 and 1820 by a major drought lasting 3 to 5 years. The drought must have caused an agricultural collapse on a large, subcontinent scale.

This was also a period of great military tension. Military pressure from Zululand spilled onto the highveld by at least 1821. Various marauding groups of displaced Sotho-Tswana moved across the plateau in the 1820s. Mzilikazi raided the plateau extensively between 1825 and 1837. The Boers trekked into this area in the 1830s. And throughout this time settled communities of Tswana people also attacked each other.

As a result of this troubled period, Sotho-Tswana people concentrated into large towns for defensive purposes. Because of the lack of trees they built their settlements in stone. These stone-walled villages were almost always located near cultivatable soil and a source of water. Such sites are known to occur near Kriel (e.g. Pelser, et al 2006) and in the Bronkhorstspruit area and to the south (Taylor 1979).

Historic period

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Few towns were established and it remained an undeveloped area until the discovered of coal and later gold. The establishment of the NZASM railway line in the 1880s, linking Pretoria with Lourenço Marques and the world at large, brought much infra-structural and administrative development to the area. This railway line also became the scene of many battles during the Anglo-Boer War and a concentration camp was established near the Balmoral station, northwest of the study area.

During the Second South African War (1899-1902), a number of skirmishes occurred in the larger region, with one of the last and biggest battles fought that being at Bakenlaagte south of the town of Kriel on 30 October 1901 (Figure 5.24). In line with the 'scorched earth' policy, most farmsteads were destroyed by the British during the latter part of the hostilities. The railway line towards Lourenço Marques (Maputo), played a pivotal role in the latter part of the War, with numerous skirmishes taking place along it.

Coal mining occurred only sporadically in the area. However, with the discovery of the Witwatersrand gold fields, the need for a source of cheap energy became important, and coal mining developed on a large scale in various regions. By 1899, at least four collieries were operating in the Middelburg-Witbank2 district, supplying the gold mining industry.

Figure 5.24: Clewer Station was used as hospital during the Second South African War (1899-1902)

Site Specific Review:

Although landscapes with cultural significance are not explicitly described in the NHRA, they are protected under the broad definition of the National Estate (Section 3): Section 3(2)(c) and (d) list "historical settlements and townscapes" and "landscapes and natural features of cultural significance" as part of the National Estate. The examination of historical maps and aerial photographs help us to reconstruct how the cultural landscape has changed over time as is show how humans have used the land.

From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing or the making of agricultural fields. No built structures are visible in the project area (Figure 5.25). Most development that took place was the rapid growth of the townships surrounding the project area.

During the survey, no sites, features or objects of cultural significance dating to the Stone Age, Iron Age or Historic Period were identified in the project area.

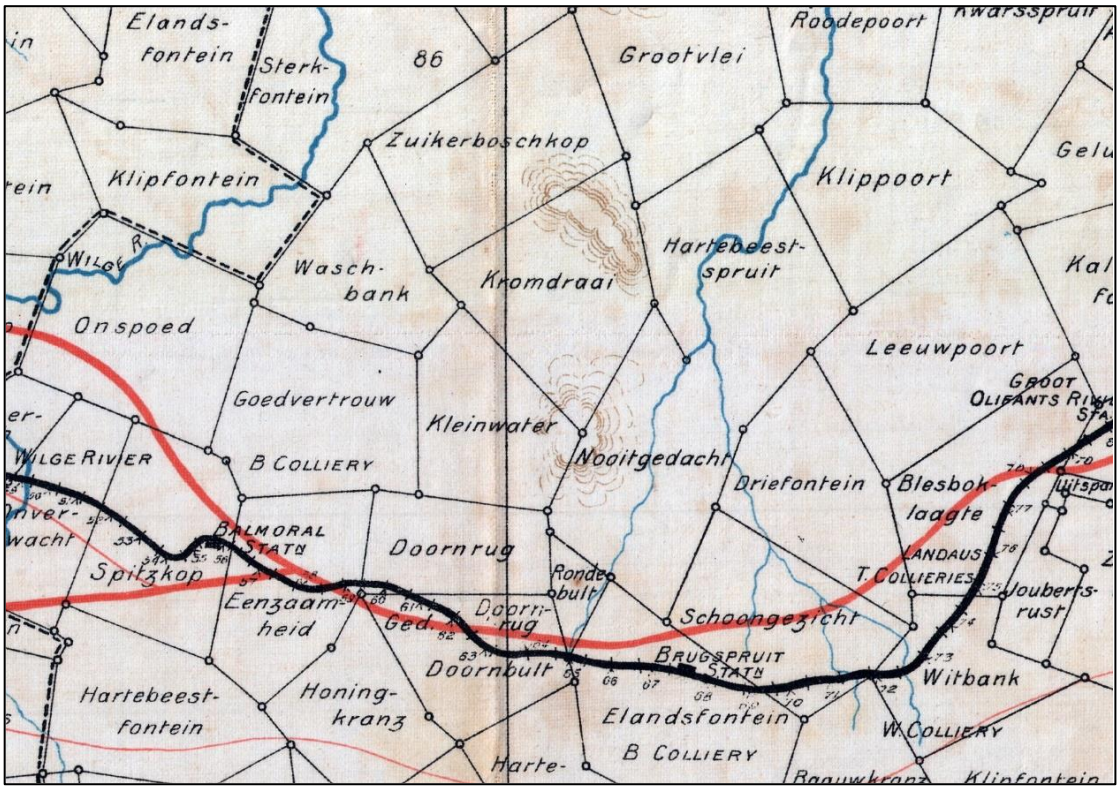


Figure 5.25: Imperial Map of South Africa: Section Heidelberg (1900)

Palaeontology

According to the Palaeontological Impact Assessment (Appendix D6), the proposed Highveld SPP near Witbank in Mpumalanga is depicted on the 1:250 000 Pretoria 2528 (1978) Geological Map (Council for Geosciences, Pretoria) . The proposed development is underlain by the Vryheid Formation (Pe, green; Ecca Group, Karoo Supergroup) with a portion of the western margin on the edge of the Dwyka Group. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Vryheid Formation (Ecca Group) is Very High. The geology has recently been updated (Council of Geosciences, Pretoria) and this map (Figure 5.26) indicates that the proposed Highveld SPP is mostly underlain by the Vryheid Formation with the western portion underlain by the Dwyka Group.

The site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 2 October 2022. No fossiliferous outcrop was detected during the site visit. The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a Low significance in palaeontological terms. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area.

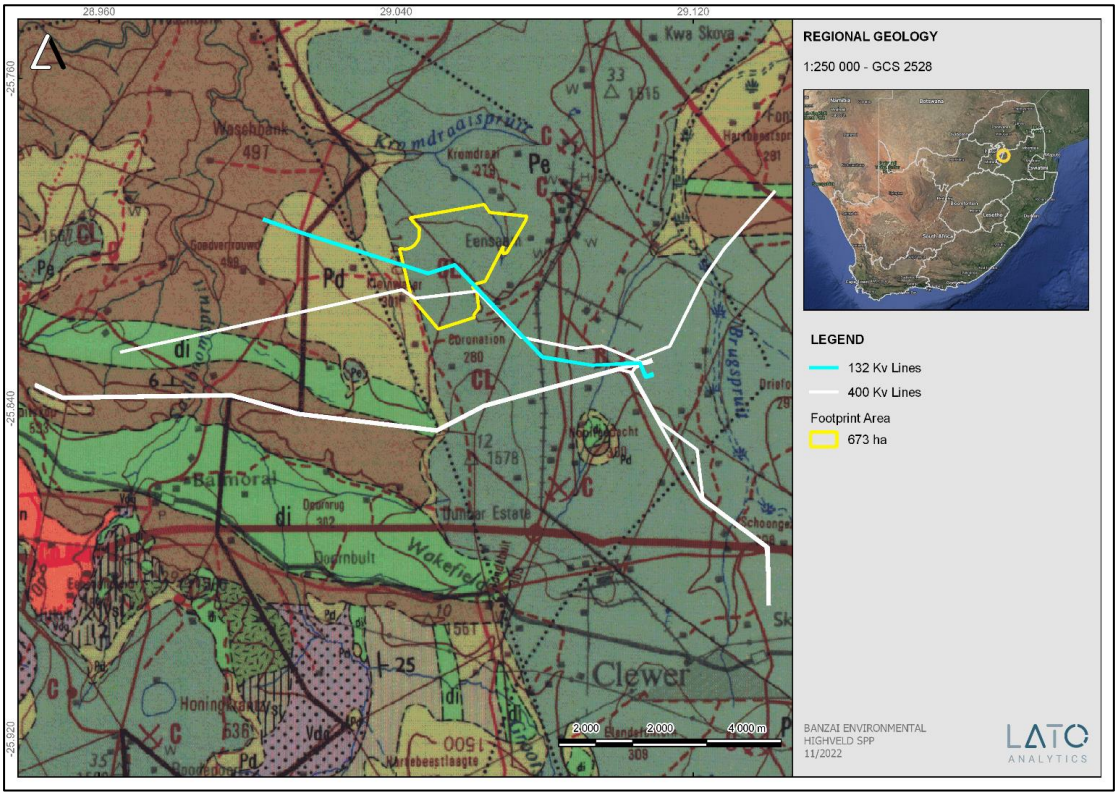


Figure 5.26: Extract of the 1:250 000 Pretoria 2528 (1978) Geological Map (Council for Geosciences, Pretoria) indicating the proposed Highveld SPP near Witbank in Mpumalanga.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the facility 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 Mpumalanga Province has a huge potential for the generation of power from solar.

The receptiveness of the site to PV development includes the presence of optimal conditions for the siting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The site where the project is proposed to be located is considered favourable 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 energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The Mpumalanga receives a high average 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 per year is relevant in the area.

- **Renewable Energy Development Zone (REDZ):** The site is also located in the eMalahleni Renewable Energy Development Zones (REDZ). The solar PV assessment domain was based on the location of the majority of existing solar PV project

applications at the commencement of the Strategic Environmental Assessment (SEA) and includes the five provinces of Northern Cape, Western Cape, Eastern Cape, Mpumalanga and North West.

- **Site availability and access:** The land is available for lease by the developer and consent has been provided by the affected landowner for the undertaking of the BA process on the three affected properties. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be easily obtained via the existing gravel road, using two possible access points to the site.

- **Grid connection**: In order for the PV facility to connect to the national grid a 132kV power line will be constructed. It is expected that generation from the facility will tie in with the existing Eskom Vulcan 400kV MTS Substation. A pre-negiotiated grid connection corridor with a width between 250m to 690m have been identified for the placement of the power line. The connection power line will be constructed within the limits of the grid connection corridor. Available grid connections are becoming scarce and play a huge role when selecting a viable site.

- **Environmental sensitivities:** From an environmental perspective the proposed site/development footprint is considered desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and ecological features and the visual landscape – refer to Section 5.3.1 of this report. Where ecological features and habitats have been identified and considered the relevant ecological specialist has advised that development within these areas are appropriate subject to the implementation of strict mitigation measures. Areas under crop production through pivot irrigation within the area under assessment have been avoided and demarcated as no-go to development by the developer from the onset of the process. Important features of note was identified from an ecological and conservation point of view, which included delineated wetlands. The specialist recommends a 15m buffer to be adhered to for this feature with no disturbance to be allowed.

It is evident from the discussion above that the area and development footprint under assessment may be considered favourable and suitable in terms of these site characteristics. As mentioned previously, no alternative areas on the within the affected properties have been considered. However, provision was made for the avoidance of the areas under pivot irrigation and sensitive environmental features such as the demarcated wetlands (HGM 1-9) and the "Rocky Outcrop".

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

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

Therefore, development of the 300 MW Highveld Solar Power Plant on Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279, is the preferred option. The amended layout

included in the attached Figure I. It is therefore concluded that no other alternatives are considered as part of the BA process.

Only one gird connection corridor has been identified for the placement of the power line and identified by the Applicant as the preferred option from a technical perspective. This option is therefore more desirable to be developed from an environmental perspective.

The grid connection corridor includes the presence of wetland features that must be buffered by 15m and disturbance within must be avoided. The presence of this feature also increases the sensitivity of the area from a faunal and avifaunal perspective as it presents a corridor for faunal movement.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 1. (3)(i) An BAR (...) must include-

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) a description of all environmental issues and risks that were identified during the EIA process; and

(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

(j) an assessment of each identified potentially significant impact and risk, including-

(i) cumulative impacts;

(ii) the nature, significance and consequences of the impact and risk;

(iii) the extent and duration of the impact and risk;

(iv) the probability of the impact and risk occurring;

(v) the degree to which the impact and risk can be reversed;

(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and

(vii) the degree to which the impact and risk can be mitigated;

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;

6.1 SCOPING METHODOLOGY

The contents and methodology of the basic assessment report aimed 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 26 September 2022. The site visit was conducted to ensure a proper analysis of the site specific characteristics of the site. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and to 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	×			Three channelled valley bottoms, three unchanneled valley bottoms and three hillslope seep wetlands were identified within the PAOI.
II. A conservation or open space area	×			The PAOI overlaps mostly with areas classified as 'Heavily Modified' and 'Other Natural Areas', smaller portions of CBA: Irreplaceable and CBA: Optimal are also triggered
III. An area that is of cultural importance		×		None.
IV. Site of geological/palaeontological significance		×		No fossiliferous outcrop was detected.
V. Areas of outstanding natural beauty		×		None.

VI. Highly productive agricultural land	×			Areas under crop production through pivot irrigation is present, however these areas are avoided by the development footprint.
VII. Floodplain		×		None.
VIII. Indigenous Forest		×		None.
IX. Grass land	×			A 'Vulnerable' ecosystem type is one which is considered to be at a high risk of collapse, and 'Poorly Protected' ecosystems are those which have between five per cent and 50% of their biodiversity target included in one or more protected areas
X. Bird nesting sites		×		None.
XI. Red data species		×		None.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			The VIA (refer to Annexure D3) confirmed that the development of the solar power plant and associated power line will have a negative low visual impact on observers. The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads. The visual landscape is already degraded due to the large number of mines and Eskom electricity infrastructure in the area.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of months. However, there are mines located directly adjacent to the site. The noise impact is therefore insignificant in comparison to the noise generated by the mine and will only be temporary in nature.

IV. Construction of an access road	×			Three access points required for the development to ensure that access is available to all sections of the development footprint as a whole
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 885 employment opportunities will be created during the construction and 15 - 70 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 4200 m^3 per annum.
VIII. Job creation	×			Approximately 885 employment opportunities will be created during the construction and 15 - 70 employment opportunities during the operational phases for the SPP.
IX. Traffic generation	×			It is estimated that on average 42 trips per day will be generated over the 12-18 month construction period for the SPP. This will however differ during the different stages of construction.
X. Soil erosion	×			The site will need to be cleared or graded, 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. No existing areas of erosion was identified.

XI. Installation of additional bulk telecommunication, transmission lines or facilities	×			There is existing Eskom infrastructure in the area and the Solar Power Plant will require the development of a power line to be constructed.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			Three channelled valley bottoms, three unchanneled valley bottoms and three hillslope seep wetlands were identified within the PAOI.
II. A conservation or open space area	×			The PAOI overlaps mostly with areas classified as 'Heavily Modified' and 'Other Natural Areas', smaller portions of CBA: Irreplaceable and CBA: Optimal are also triggered Large portions of the PAOI overlap with NPAES priority areas for protected area expansion. Priority focus areas are often large portions of undeveloped natural land occurring within important
III. An area that is of cultural importance		×		None.
IV. A site of geological/palaeontological resources significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. A tourist resort				
VIII. A formal or informal settlement	×			The Empumelelweni informal settlement is located approximately 3 km south east of the 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 6.3) for more in-depth assessment. An indication is provided of the specialist studies which were conducted and that 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.

In order 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.

Detailed impact assessments have been undertaken by each of the respective specialists which has informed the matrix analysis as included in Table 6.3, as well as the key issues identified as included in sections 6.2.1-6.2.3.

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) (GNR 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 12(ii)(a)(b) (GNR 327): *"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,*	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	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop habitats in certain areas), ecosystems and the vegetation community (including protected plants). • 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	L	D	BR	SL	Yes	• See Table 6.4	L	Terrestrial Biodiversity Impact Assessment (Appendix D1)
			Wetland/ Riparian areas	• Direct disturbance / degradation / loss to wetland soils or vegetation due to the construction of the solar facility. • Increased erosion and sedimentation.		-	S/L	L	D	BR	SL	Yes	• See Table 6.4	M	Wetland Baseline and Risk Assessment (Appendix D1)

measured from the edge of a watercourse. 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 (GNR 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 cubic meters 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*	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 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.			• Potential contamination of wetlands with machine oils and construction materials.										
			Avifauna	• Habitat destruction within the project footprint • Destruction, degradation and fragmentation of surrounding habitats • Displacement/emigration of avifauna community (including SCC) due to noise pollution • 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 6.4	L	Avifaunal Impact Assessment (Appendix D2)
			Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities. • Ecosystem damage due to pollutants and dust	-		S	S	D	CR	NL	Yes	• A speed limit should be enforced on dirt roads (preferably 30-40km/h). • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.	L	Terrestrial Biodiversity, Plant and Animal Species Impact Assessment (Appendix D1)
			Soil	• Loss of Land Capability	- /+		S	S	Pr	PR	ML	Yes	• See Table 6.4	L	Soil and Agriculture Assessment (Appendix D4)
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site.		-	L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality

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 (f)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) in the Mpumalanga province, (i) outside*				• Generation of sewage that need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.										to provide services
			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	• A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. Monitoring boreholes should be securely capped (where used), 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 (e.g. screen and casing lengths, diameters, total depth, etc). • Sampling of monitoring boreholes should be done according to recognised standards.	L	-
			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,		-	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	L	-

urban areas and within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans". <u>Activity 10 (f)(i)(ee)(hh) (GN.R 324):</u> *"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 Mpumalanga Province (i) outside urban areas and 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 edge of a watercourse or wetland."* <u>Activity 12 (f)(ii)(iii) (GN.R 324):</u> *"The clearance of an area of 300 square metres or*				streams, etc) as a primary source of water. • Generation of hazardous waste								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 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.		

more of indigenous vegetation…(f) in the Mpumalanga Province (ii) 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 Spatial Biodiversity Assessment 2004 and (iii) within critical biodiversity areas identified in bioregional plans." <u>Activity 14(ii)(a)(c)(f)(i)(ff) (GN.R 324):</u> *"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 (f) Mpumalanga Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic*													• 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	Local unemployment rate	• Direct and indirect employment opportunities and skills development • Economic multiplier effect		+	L/P	S	D	PR	N/A	Yes	• Where reasonable and practical, the SPP service providers should appoint local contractors and implement a 'locals first' policy,	M	Social Impact Assessment

biodiversity plans adopted by the competent authority or in bioregional plans." Activity 18 (f)(i)(ee) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (f) in the Mpumalanga (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.."*												especially for semi and low-skilled job categories		(Appendix D7)
			Visual landscape	• Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed Highveld SPP	-		L	S	D	PR	ML	Yes	• See Table 6.4	L	Visual Impact Assessment (Appendix D3)
			Traffic volumes	• Traffic Congestion • Increase in traffic volumes • Impact on road safety	-		N	S	D	CR	NL	Yes	• See Table 6.4	M	Traffic Impact Assessment (Appendix D8)
			Health, Safety & other social aspects	• Potential loss of productive farmland • Air/dust pollution. • Impacts on safety and security. • 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. • Impacts on daily movement patterns. • Nuisance impacts • Increased risk of veld fires. • Visual and sense of place impacts		-	L	P	Pr	PR	ML	Yes	• See Table 6.4	L	Social Impact Assessment (Appendix D7)
			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	• See Table 6.4	L	Social Impact Assessment (Appendix D7)
			Tourism industry	• Since there are no 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	• Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries	-		S	S	U	CR	NL	Yes	• As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a	L	Heritage Impact Assessment

													result of the proposed development. • Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained, and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.		(Appendix D5)
			Paleontological Heritage	• Loss of fossil heritage • Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	-		S	P	L	BR	SL	Yes	• See Table 6.4	L	Paleontological Impact Assessment (Appendix D6)
OPERATIONAL PHASE															
<u>Activity 11(i) (GNR 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 14 (GNR 327):</u> *"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*	The key components of the proposed project are described below: • <u>PV Panel Array</u> - To produce 300 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.	BIOPHYSICAL ENVIRONMENT	Fauna and Flora	• Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive wetland and rocky areas, and protected plants). • 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.)		-	S/L	L	D	BR	SL	Yes	• See Table 6.5	L	Terrestrial Biodiversity, Impact Assessment (Appendix D1)
			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 6.5	L	Avifaunal Impact Assessment (Appendix D2)

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 (f)(i)(ee)(gg) (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 (f) in the Mpumalanga Province (i) outside urban areas and 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 edge of a*	• Wiring to Central Inverters - Sections of the PV array will be wired to central 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 and switching station will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. • Supporting Infrastructure – Auxiliary buildings			• Direct mortality by roadkill during maintenance procedures • Pollution of water sources and surrounding habitat due to cleaning products of the PV panels • Heat radiation from the PV panels • 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 and Agriculture	• Loss of Land Capability, Soil erosion and compaction effects.		-	L	L	D	PR	SL	Yes	• See Table 6.5	L	Soil and Agriculture Assessment (Appendix D4)
			Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and switching station and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.	-		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 floor and sides) to prevent accidental discharge to groundwater.	L	-
			Wetland/ Riparian areas	• Potential for increased stormwater runoff leading to Increased erosion and sedimentation. • Increased erosion and sedimentation. • Potential for increased contaminants entering the wetland systems.		-	S/L	L	D	BR	SL	Yes	• See Table 6.5	M	Wetland Baseline and Risk Assessment (Appendix D1)
		SOCIAL/ECONOMIC	Visual landscape	• Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP.		-	L	L	Pr	PR	SL	Yes	• See Table 6.5	L	Visual Impact Assessment (Appendix D3)

watercourse or wetland."	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, protection circuitry and Battery Energy Storage Systems (BESS). • Roads – Access will be obtained via an existing gravel road off the R104. An internal site road network will also be required to provide access to the solar field and associated infrastructure. • Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.			• 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 Highveld SPP.										
			Traffic volumes	• The proposed development will not result in any major traffic impacts during the operational phase.	-		S	L	Po	PR	NL	Yes	• See Table 6.5	L	Traffic Impact Assessment (Appendix D8)
			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
			Positive social impacts	• Direct and indirect employment and skills • development opportunities • Development of non-polluting, renewable energy • infrastructure • Contribution to LED and social upliftment • Potential impacts on tourism	+		N	L	D	PR	NL	Yes	• See Table 6.5	H-L	Social Impact Assessment (Appendix D7)
			Negative social impacts	• Potential impacts on tourism • Impacts associated with the loss of agricultural land.	-		L	L	Pr	PR	SL	Yes	• See Table 6.5	L	Social Impact Assessment

				• Visual and sense of place impacts											(Appendix D7)
			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	• Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries	-		S	S	U	CR	NL	Yes	• As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development. • Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained, and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.	L	Heritage Impact Assessment (Appendix D5)
			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															
-	Dismantlement of infrastructure During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled.	BIOPHYSICAL ENVIRONMENT	Fauna and Flora	• Direct habitat destruction – loss and damage to natural habitats, impact/changes on vegetation & fauna communities, loss of threatened / near-threatened taxa, impact to fauna • Habitat fragmentation – disruption of natural movement patterns		-	S/L	L	D	BR	SL	Yes	• 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.	M	Terrestrial Biodiversity, Plant and Animal Species Impact Assessment

	Rehabilitation of biophysical environment The biophysical environment will be rehabilitated.			• Increased soil erosion and fragmentation – terrestrial ecological changes including establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora • Soil and water pollution • Spread and establishment of alien invasive species • Negative effect of human activities and road mortalities – snaring, killing and hunting of certain faunal species, litter and inadequate sanitation, risk of uncontrolled fires								• 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 will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till rehabilitated areas / closure 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 (Table 6.4).		(Appendix D1)
			Avifauna	• Direct mortality due to earthworks, vehicle collisions and persecution	-		S/L	L	D	BR	SL	Yes	• See table 6.4.	L	Avifauna Impact Assessment (Appendix D2)
			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	• Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. • If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. • During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	L	Agricultural Compliance Statement (Appendix D4)
			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	Confirmation from the Local Municipality to provide services
			Groundwater	• Pollution due to construction vehicles	-		S	S	Pr	CR	ML	Yes	• All vehicles should be inspected for oil and fuel leaks on a regular basis. • Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be	L	-

													emptied into a holding tank and returned to the supplier.		
			Wetland/ Riparian areas	• Impact on the characteristics of the watercourse – i.e. flow regime, habitat, biota, water quality and geomorphology due to disturbance within the floodline • Soil compaction and increased sediment transport and erosion • Soil and water pollution • Spread and establishment of alien invasive species		-	S/L	L	D	BR	SL	Yes	• Plant vegetation species for rehabilitation that will effectively bind the loose material and which can absorb run-off from the development 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 stormwater measures must be maintained • Water management facilities will stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The development areas will be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities will continue till closure of the site 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	L	Wetland / Riparian Impact Assessment (Appendix D1)

			Visual landscape	• Visual impact of activities on sensitive visual receptors in close proximity to the proposed Highveld SPP • 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 Highveld SPP it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life. No decommissioning of the facility is proposed.	-		L	S	D	PR	ML	Yes	• See Table 6.4	L	Visual Impact Assessment (Appendix D3)
			Traffic volumes	• Road network will be affected • Increase in traffic influencing traffic congestion and road safety	-		L	S	D	CR	NL	Yes	• See Table 6.6	L	Traffic Impact Assessment (Appendix D8)
			Health & Safety	• Air/dust pollution. • Road safety. • 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.	-		L	S	Pr	PR	ML	Yes	• Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. • Where dust is generated by trucks passing on gravel roads, dust mitigation must be enforced. • Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community. • Components that are dismantled must be recycled / reduced as far as possible.	L	-
			Noise levels	• The generation of noise as a result of construction vehicles, the use of	-		L	S	D	CR	NL	Yes	• The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise within	L	Social Impact Assessment

				machinery and people working on the site									standard working hours in order to reduce disturbance of dwellings in close proximity to the development.		(Appendix D7)
			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	NL	Yes	• Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.	L	Heritage Impact Assessment (Appendix D5)

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	-

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPr for the Solar Power Plant is included in Appendix F1. The EMPr for the power line is included in Appendix F2 and the EMPr for the substation is included in Appendix F3. An Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F4.

An Environmental Awareness and Fire Management Plan is included in Appendix I of the EMPr in Appendix F1.

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 were addressed in more detail in the BA 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) (GNR 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 12(ii)(a)(b) (GNR 327): *"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 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 (GNR 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 cubic meters 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 (f)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) in the Mpumalanga province, (i) outside urban areas*

and within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans".

- Activity 10 (f)(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 Mpumalanga Province (i) outside urban areas and 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 edge of a watercourse or wetland."*

- Activity 12 (f)(ii)(iii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation…(f) in the Mpumalanga Province (ii) 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 Spatial Biodiversity Assessment 2004 and (iii) within critical biodiversity areas identified in bioregional plans."*

- Activity 14(ii)(a)(c)(f)(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) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; in the (f) Mpumalanga 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."*

- Activity 18 (f)(i)(ee) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (f) in the Mpumalanga (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.."*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. Table 6.4 summarises 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 Biodiversity Impact Assessment (Appendix D1)	Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop habitats in certain areas), ecosystems and the vegetation community (including protected plants).	Negative High	Negative Low	• All 'High' sensitivity areas should be avoided, and these areas should be clearly demarcated by non-hazardous/dangerous fencing. Brush cutting should be implemented beneath the panels, no vegetation clearing should be permitted. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the 'Very Low' and 'Low' sensitivity areas. • The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. • Any observed SCC flora or protected plants must be clearly demarcated prior to the commencement of site clearing. If construction activities are likely to affect any SCC or protected plants these individuals must be relocated as part of a plant rescue and protection plan, and a permit may need to be obtained before doing so. • Existing access routes, especially roads, must be made use of. • 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. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.

				• All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. • A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas. • 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 project area 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. • Where a registered disposal facility is not available close to the project area, 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 protected species and sensitive habitat, 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 any sensitive areas to be avoided. • 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 High	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 due to the likely occasional presence of SCC.

	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative Medium	Negative Low	• A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should 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, always outwards and away from the centre of the PAOI 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 any 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 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. Holes must be subsequently inspected for fauna prior to backfilling. • Fencing mitigations: • Top 2 strands must be smooth wire • Routinely re-tension loose wires • Minimum 30cm between wires • Place markers on fences. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, 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. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).
Wetland Baseline and Risk Assessment (Appendix D1)	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.

Avifaunal Assessment (Appendix D2)	Habitat destruction within the project footprint	Negative High	Negative Medium	• Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigeic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas; • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents; • Vegetation clearing to commence only after the necessary permits have been obtained; and • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
	Destruction, degradation and fragmentation of surrounding habitats	Negative High	Negative Low	• Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc. • All solid waste must be managed in accordance with the Solid Waste Management Plan. Recycling is encouraged;

				• All construction activity and roads to be within the clearly defined and demarcated areas; • Temporary laydown areas should be clearly demarcated and rehabilitated with indigenous vegetation subsequent to end of use; • Appropriate dust control measures to be implemented; • Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act; • No cement/concrete may be mixed on site where feasible and must be brought in off site to ensure the water sources does not get polluted and that successful rehabilitation of the construction areas can take place; and • All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.
	Displacement/emigration of avifauna community (including SCC) due to noise pollution	Negative Medium	Negative Low	• Noise pollution is difficult to mitigate against. • No construction activity is to occur at night, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes; • All vehicles speed must be restricted to 20 km/h, to reduce the noise emitted by them; and • If generators are to be used these must be soundproofed.
	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 species and collecting eggs;

				• Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area; and • Any avifauna threatened by the construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist.
	Direct mortality from increased vehicle and heavy machinery traffic	Negative Medium	Negative Low	• All personnel should undergo environmental induction with regards to awareness about speed limits and roadkill; and • All construction vehicles should adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
Soil and Agriculture Assessment (Appendix D4)	Loss of Land Capability	Negative Medium	Negative Low	• Avoidance of actively cultivated areas, where avoidance is not feasible stakeholder engagement should occur to compensate affected landowners; • Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum; • A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures; • Substations foundation and pylons placement must be (preferably) located in already disturbed areas that are not actively cultivated; and • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts; and

				• An alien invasive plant species and control programme must be implemented from the onset of the project.
Heritage Impact Assessment (Appendix D5)	Direct or physical impacts, implying alteration or destruction of heritage features	Negative Low	Negative Low	• 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).
Palaeontological Impact Assessment (Appendix D6)	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	Negative Low	Negative Low	• No fossil heritage were identified on site.
Visual Impact Assessment	Visual impact of construction activities on	Negative Medium	Negative Low	Planning

(Appendix D3)	sensitive visual receptors in close proximity to the proposed SPP			• 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 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.
Social Impact Assessment (Appendix D7)	Direct and indirect employment opportunities and skills development	Positive Low	Positive Medium	Enhancement: • 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 EMalahleni LM, Mpumalanga 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 effect	Positive Low	Positive Medium	Enhancement: • 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 of productive farmland	Negative Medium	Negative Low	• The proposed site 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.
	Influx of jobseekers and change in population	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 closest towns 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 project site. • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • 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.
	Safety and security impacts	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 Low	• 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, that have to be maintained for the duration of the construction phase, and control measures along the R104 and gravel road off the R104 roads 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 impacts (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 implemented 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.
	Visual and sense of place impacts	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 study area.
Traffic Impact Assessment	Increase in traffic volumes, influencing	Negative Medium	N/A	• Stagger component delivery to site. • Reduce the construction period.

(Appendix D8)	traffic congestion and road safety			• The use of mobile batch plants and quarries in close proximity to the site. • Staff and general trips should occur outside of peak traffic periods. • Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase • All construction vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.

6.2.2 Impacts during the operational phase

During the operational phase the study area 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) (GNR 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 15 (GN.R 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*
- Activity 4 (f)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (f) in the Mpumalanga province, (i) outside urban areas and within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans*".
- Activity 10 (f)(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 Mpumalanga Province (i) outside urban areas and 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 edge of a watercourse or wetland."*

Table 6.5 summarised the negative impacts are generally associated with the Highveld Solar Power Plant (including other associated infrastructure) and power line, which include impacts on the fauna and flora, soils, geology, surface water, the pressure on existing services infrastructure, and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community

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 Impact Assessment (Appendix D1)	Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive wetland and rocky areas, and protected plants).	Negative High	Negative Low	• The removal of indigenous plants should be kept to a minimum necessary. Trim, rather than fell of woody species along the edges of the development site where possible. The clearing and damage of plant growth in the riparian and wetland areas should be restricted to the actual road crossing where possible, and not into the sensitive adjacent areas. Where protected plants such as geophytes will need to be cleared or pruned, permits should be obtained from the relevant authority. • Peripheral impacts around the development footprint sites on the surrounding vegetation of the area should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum, while the rehabilitation of the site should be prioritized after construction has been completed. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • All development activities should be restricted to specific recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted

				to fit natural patterns rather than imposing rigid geometries. The entire development footprint should be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development. • The ECO should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. • Where holes for poles pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling during planting of the poles along the lines. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.

				• Monitoring should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area.
	Continuing spread of IAP and weed species.	Negative High	Negative Low	• Use existing facilities (e.g., impacted areas) to the extent possible to minimize the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive features such as surrounding woodland and riparian woodland outside the project area during construction. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Construction activities must remain within defined construction areas. No construction / disturbance will occur outside these areas.
	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise,	Negative High	Negative Low	• The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time. • Cover disturbed soils as completely as possible, using vegetation or other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion

	light, dust, vibration, poaching, etc.)			resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Gravel roads to the construction sites must be well drained to limit soil erosion. • Control the flow of runoff to move the water safely off the site without destructive gully formation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.
Wetland / Riparian Impact Assessment (Appendix D1)	Potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Negative Medium	Negative Low	• Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels. • Release only clean water into the environment. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in). • Re-vegetate denuded areas as soon as possible. • Regularly clear drains. • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving. • Avoid excessively compacting the ground beneath the solar panels.

	Potential for increased contaminants entering the wetland systems.	Negative Medium	Negative Low	• Where possible minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events.
Avifaunal Assessment (Appendix D2)	Collisions with infrastructure associated with the PV Facility	Negative Very High	Negative Low	• 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; and • 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; and • Signs must be put up to enforce this, should someone be caught a R1000 fine must be enforced.

	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; and • All vehicles should adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
	Pollution of water sources and surrounding habitat due to cleaning products of the PV panels	Negative High	Negative Low	• Only environmentally friendly chemicals are to be used for cleaning of the panels.
	Heat radiation from the PV panels	Negative Medium	Negative Low	• A fire management plan needs to be put in place; and • Grass must be kept under the panels to ensure that additional reflection is not taking place from the surface below the panels
	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; and • All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan. •

Soil and Agricultural Assessment (Appendix D4)	Loss of Land Capability, Soil erosion and compaction effects	Negative Low	Negative Low	• No mitigation measures based on the low impact significance. • No further loss occurs in the subsequent project phases.
Heritage Impact Assessment (Appendix D5)	Direct or physical impacts, implying alteration or destruction of heritage features	Negative Low	Negative Low	• 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).
Visual Impact Assessment (Appendix D3)	Visual impact on observers travelling along the roads and residents at homesteads within	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.

	a 5km radius of the SPP			• 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.	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 impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility.	Negative Medium	Negative Low	Planning & Operation • 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.
	Visual impacts of glint and glare on	Negative Low	N/A	• No mitigation measures are required.

	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	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 impacts and sense of place impacts associated with the operation phase of Highveld SPP	Negative Low	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.
Social Impact Assessment (Appendix D7)	Direct and Indirect employment opportunities and skills development	Positive Low	Positive Medium	Enhancement: • 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 enhancement identified
	Potential loss of agricultural land	Negative Medium	Negative Low	• The proposed mitigation measures for the construction phase should have been implemented at this stage. • Mitigation measures from the Agricultural Compliance Statement should also be implemented.
	Contribution to Local Economic Development (LED) and social upliftment	Positive Medium	Positive High	Enhancement: • A 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).
	Impact on tourism	Negative Low / Positive Low	Negative Low / Positive Low	• The impact rating is dependent on how the development is perceived by tourism. In some cases, renewable energy developments can be seen as an addition to the tourist industry in the area (positive low) or it can be viewed as a negative. The rating is subjective. • 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 and sense of place impacts	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard
Traffic Impact Assessment (Appendix D8)	The road network will be affected as there will be an increase in traffic, congestion and impact on road safety	Negative Low	N/A	• All operations and maintenance vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating. • All vehicle drivers need to strictly adhere to the rules of the road.

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 6.6 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
Avifaunal Assessment (Appendix D2)	Direct mortality due to earthworks, vehicle collisions and persecution	Negative Medium	Negative Low	• All personnel should undergo environmental awareness including educating about not harming or collecting species; • Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate; • Any avifauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist; • All construction vehicles should adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected; • All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner; • All infrastructure including powerlines must be removed if the facility is decommissioned; and • The project area must be rehabilitated, and a management plan must be in place to ensure that it is done successfully.
	Continued habitat degradation due to Invasive Alien Plant	Negative Very High	Negative Low	• Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase;

	encroachment and erosion			• Monitoring of the rehabilitated area must be undertaken at quarterly intervals for 3 years after the decommissioning phase; • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques; and • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.
Wetland / Riparian Impact Assessment (Appendix D1)	Potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Negative Medium	Negative Low	• Develop and implement a rehabilitation and closure plan. • Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species

6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

- Terrestrial Biodiversity Assessment – Biodiversity Company (see Appendix D1)
- Wetland Baseline and Risk Assessment – Biodiversity Company (see Appendix D1)
- Avifaunal Impact Assessment – Biodiversity Company (see Appendix D2)
- Visual Impact Assessment – Donaway Environmental Consultants (see Appendix D3)
- Soil and Agriculture Assessment – Biodiversity Company (see Appendix D4)
- Heritage Impact Assessment – JA van Schalkwyk Heritage Consultants (see Appendix D5)
- Palaeontological Impact Assessment – Banzai Environmental (see Appendix D6)
- Social Impact Assessment – Donaway Environmental Consultants (see Appendix D7)
- Traffic Impact Assessment – Iris Wink (see Appendix D8)

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

6.3.1 Issue 1: Heritage and archaeological impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

"Will the proposed development impact on any heritage or archaeological artefacts?"

According to the Heritage Impact Assessment (Appendix D5) cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which also gave rise to an urban and industrial (mining) component.

The impacts expected to occur will be of a low significance based on the fact that no sites of cultural significance or value was identified or discovered.

For this proposed project, the assessment has determined that no sites, features or objects of cultural heritage significance occur in the project area, therefore no permits are required from SAHRA or the PHRA. If heritage features are identified during construction, as stated in the

management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

From a heritage point of view, it is recommended that the proposed project be allowed to continue on acceptance of the mitigation measures presented and the conditions proposed.

6.3.2 Issue 2: Ecological Impacts

The potential impact of the proposed development on flora and fauna known to occur in the Mpumalanga Province had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the ecology?"

According to the Terrestrial Biodiversity Assessment (Appendix D1), the six delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 6.6 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 6.1 below.

It is important to note that this map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 6.6 Sensitivity summary of the habitat types delineated within the Project Area of Influence

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Low	Low	**Low**	High	**Very Low**
Critically Modified Grassland	Low	Medium	**Low**	Medium	**Low**
Modified Grassland	Medium	Medium	**Medium**	Medium	**Medium**
Secondary Water Resource	Medium	Low	**Low**	Low	**Medium**
Primary Water Resource	High	Medium	**Medium**	Low	**High**
Rocky Outcrop	Medium	Medium	**Medium**	Low	**High**

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 ESA and CBA areas):

- Very Low: Minimisation mitigation – Development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- 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

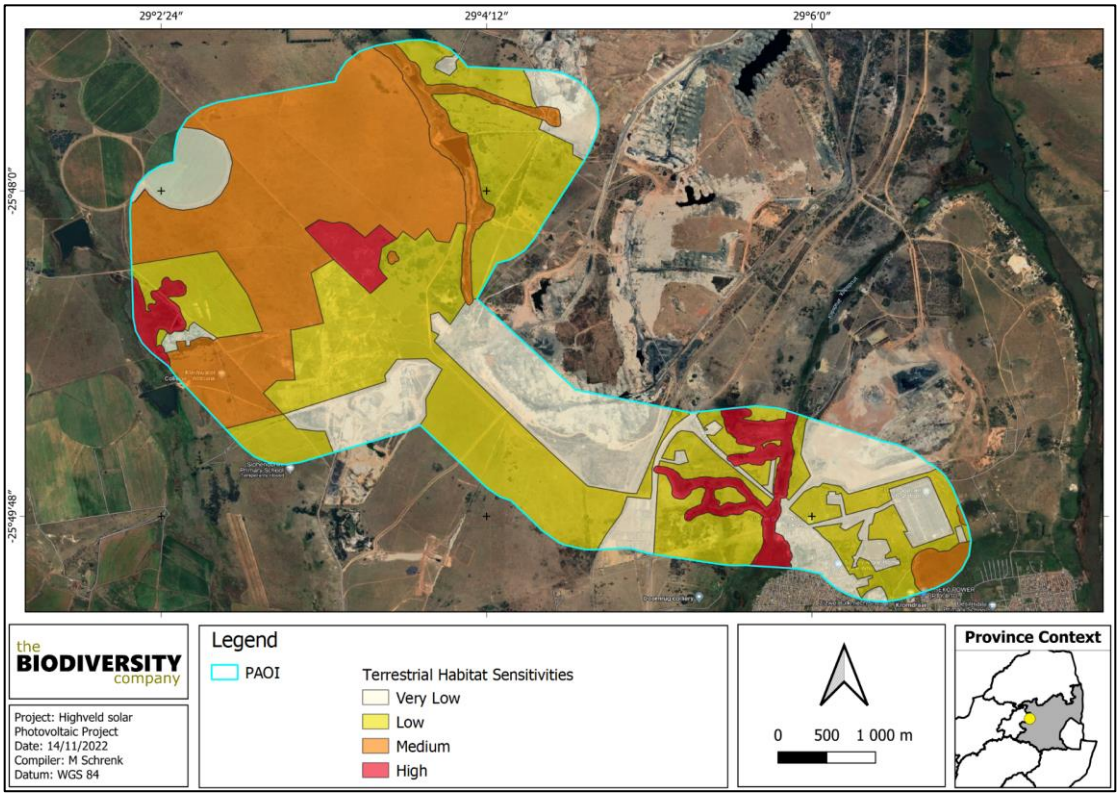


Figure 6.1: Map illustrating the sensitivities of the habitats delineated within the overall Project Area of Influence

The PAOI overlaps with impacted CBA and ESA areas, as well as functional portions of land that are provincially classified as 'Other Natural Areas' and 'Heavily Modified Areas' - which are in a state of recovery. Parts of the PAOI also intercept with 'Critically Endangered' wetland systems and rocky features. For these reasons it is important that the management outcomes presented above be adhered to, in order to properly mitigate the negative environmental impacts that will stem from the project activities.

No flora SCC were recorded during the survey; however, it is noted that some of these may be found to occur in the 'High' sensitivity areas. One fauna SCC was recorded, Equus quagga (plains zebra), and certain additional local fauna SCC may occasionally be found foraging within the PAOI, specifically within the Rocky Outcrop and Primary Water Resource areas. No protected tree species are likely to occur, although a significant number (>100) of provincially protected plants were recorded.

Completion of the terrestrial biodiversity assessment led to a disputing of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. The PAOI is instead assigned an overall sensitivity of 'Medium', because of the high diversity of flora species recorded in addition to the fact that the

ecosystem currently exists in a reasonably functional state, and portions of sensitive wetland and rocky outcrop features were recorded.

The main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of functional grassland areas);
- Degradation of surrounding habitat;
- Disturbance and displacement of fauna (including direct mortality); and
- Introduction and further spreading of IAP and weed species.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from 'Medium' – 'High' to 'Low'). The cumulative impact of the overall project, taking into account the transformation of surrounding land, is rated as 'Low'. This is because the proposed development does not result in the loss of any important habitat corridors and the overall project footprint is regarded as relatively small, especially considering the fact that no other significant solar projects are approved in the region (within a 30 km radius).

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

It is recommended that a plant rescue and protection plan be developed for the proposed project, and implemented prior to the start of the construction phase and during the wet season. This is to limit the loss of a large number of provincially protected plant species that were confirmed to occur within the PAOI.

6.3.3 Issue 3: Wetland / Riparian Impacts

The potential impact of the proposed development on wetlands known to occur on site, had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the wetlands?"

According to the Wetland Baseline and Risk Assessment (Appendix D1), during the site assessment, nine HGM units were identified and assessed within the project area of influence. These comprise of three channelled valley bottoms, three unchanneled valley bottom wetlands and three hillslope seep wetlands. The wetlands scored an overall PES scores ranging from C – "Moderately Modified" to E "Critically Modified" due to the modification to both the hydrology and vegetation of the wetlands through anthropogenic activities. The wetlands scored "Moderate" importance and sensitivity scores due to the high protection level of both the wetland vegetation and units. The average ecosystem service score was determined to range between "Low" and "High". A 15 m post mitigation buffer was assigned to the wetland systems for both the PV area as well as the powerline corridor.

Two risk assessments have been created for this project. The first risk assessment for the PV area showed that both direct and indirect impacts will occur on the wetlands. Thus, avoidance cannot be met, and the focus was moved to minimising the impacts on the wetlands.

The second risk assessment was for the powerline corridor, the assessment showed that both direct and indirect impacts will occur on the wetlands, but with the correct placements of the pylons the avoidance can be met.

Based on the results and conclusions presented in this report, the specialist recommends that if all mitigation measures can be met with the designing of the PV area and the placement of the pylons, it is expected that the proposed activities will pose low residual risks on the wetlands and thus no fatal flaws were identified for the project. A General Authorisation (GN 509 of 2016) is required for the water use authorisation.

If the PV design cannot be altered in such a way that the wetland and their associated buffers cannot be avoided a wetland compensation plan should be compiled and a Water Use Licence (WUL) will be required.

6.3.4 Issue 4: Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in Mpumalanga Province had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the avifauna?"

According to the Avifaunal Assessment (Appendix D2), The PAOI falls in a CBA, HMA, ESA and ONA classified area it also overlaps with a CR river and numerous CR wetlands. Based on the SAPAB 2 dataset 276 indigenous avifauna species could be expected to occur within the PAOI and surrounding landscape. Of these twelve (12) are regarded as SCC, five of these have a high likelihood of occurrence, four a moderate likelihood of occurrence and one observed.

During the assessment performed in the summer (7th – 9th of October 2022) 99 species were recorded, one species the African Marsh Harrier were recorded just outside the PAOI along the Klipspruit. Eleven risk species were recorded in the survey, these are species at risk for collisions, electrocutions or highly sensitive to habitat loss. These species were recorded across four habitat types; Degraded Grassland and old agricultural fields, Tree Clumps, Water Resources and Transformed. Which were allocated a site ecological rating of Moderate, Very Low, Very High and Very Low respectively.

With the implementation of mitigations such as the installation of bird diverters on the powerline, as well as ensuring the infrastructure is appropriately insulated the impacts of collisions and electrocutions can successfully be reduced from high to moderate. The project will have a moderate- low overall impact should all the mitigations and recommendations be implemented successfully.

The main expected impacts of the proposed PV and associated infrastructure will include the following:

- Habitat loss and fragmentation;
- Electrocutions; and
- Collisions.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable residual risk level. Considering the above-mentioned information, it is the opinion of the specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented.

6.3.5 Issue 5: Visual Impacts

Due to the extent of the proposed photovoltaic solar plant it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed is:

"To what extent will the proposed development be visible to observers and to what extent will the landscape provides any significant visual absorption capacity?"

The construction and operational phase of the proposed Highveld SPP and its associated infrastructure will have a visual impact on the area, especially within (but not restricted to) a 5km radius of the proposed SPP. The visual impact will differ amongst places, depending on the distance of the SPP.

Due to the height of the power line (32m) and the extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the PV facility and power lines, but the possible visual impacts can be reduced. Several mitigation measures have however been proposed regardless of whether mitigation measures will reduce the significance of the of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the project.

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance and is characterised by mines. No buffer areas or areas to be avoided are applicable for this development.

Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity. The visual impact is also dependant on the land use of an area and the sensitivity thereof in terms of visual impact, such as protected areas, parks and other tourism related activities.

Considering all positive factors of such a development including economic factors, social factors and sustainability factors, especially in an arid country, and the industrialised and degraded landscape, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. The specialist has recommended that the project be approved.

6.3.6 Issue 6: Agricultural / impacts on the soil

In order to determine the potential impacts that the proposed development will have on agricultural production, the soil forms and current land capability of the area where the proposed project will be situated was investigated. The main question which needs to be addressed is:

"To what extent will the proposed development compromise (negative impacts) or enhance (positive impacts) current and/or potential future agricultural production?"

The Soil and Agriculture Assessment (Appendix D4) The results indicate ""Low" post-mitigation significance score ratings for the proposed Highveld SPP project and associated infrastructure. It is therefore clear that the proposed activities are expected to have a low impact on land potential resources. It is worth noting that some "High" and "Very High" sensitivity crop field areas were identified by means of the DEA Screening tool (2022) in the current existing project assessment area. It is recommended stakeholder engagement must be undertaken during the project phases to investigate possible scenarios for appropriate compensation of landowners for high crop field land use areas where necessary.

Four main sensitive soil forms were identified within the assessment area, namely the Ermelo, Clovelly, Pinedene and Hutton soil forms. The land capability sensitivities (DAFF, 2017) indicate

land capabilities with “Moderate” to “Moderate high” sensitivities, which correlates with the findings from the baseline assessment. The assessment area land potential falls mostly within “Moderate High” sensitivities which also concur with some sections from the DAFF, (2017) sensitivities. However, the soil baseline assessment findings also dispute some of the areas which were categorised as “High” following the DEA, (2022) agricultural theme screening tool. The project area is therefore assigned an overall sensitivity of ‘Moderate.’

The assessment area is associated with arable soils. However, the available climatic conditions of low annual rainfall and high evapotranspiration potential severely limits crop production significantly resulting in land capabilities with “Moderate” and “Moderate high” sensitivities. The land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use.

It is the specialist’s opinion that the proposed Highveld Solar PV project, associated Grid connection and infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed activities will result in the segregation of some high production agricultural land. However, the planned Grid connection for the proposed development will occur on already established infrastructure with minimal impacts to the land potential of these crop fields. In areas where these crop fields are still under high production, stakeholder engagement must be undertaken to compensate landowners for high crop field land use where necessary. It is, therefore, the specialist`s recommendation that the proposed Highveld Solar Power Plant project and associate infrastructure may be favourably considered for development with implementation of mitigation measure to ensure low expected significant impacts occurrence.

6.3.7 Issue 8: Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix D7). The main question which needs to be addressed is:

“How will the proposed development impact on the socio-economic environment?”

There are some vulnerable communities within the project area that may be affected by the development of Highveld SPP and its associated infrastructure. Traditionally, the construction phase of a PV solar development is associated with most social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

Based on the social impact assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks), and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project's location within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.
- When considering Highveld SPP, it is also important to consider the cumulative social impacts that may arise with other proposed solar PV projects in the area.
- It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts associated with the project. Based on the social assessment, the following recommendations are made:

- The appointment of a CLO to assist with the management of social impacts and to deal with community issues, if feasible.
- It is imperative that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction activities, where possible. Local procurement of labour and services / products would greatly benefit the community during the construction and operational phases of the project.
- Local procurement of services and equipment is required where possible in order to enhance the multiplier effect.
- Involve the community in the process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.

- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

6.3.8 Issue 9: Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

"How will the proposed development impact on the Palaeontological resources?"

According to the Palaeontological Impact Assessment (Appendix D6) the proposed Highveld SPP development is underlain by the Vryheid Formation (Ecca Group, Karoo Supergroup). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Vryheid Formation (Ecca Group) is Very High (Almond et al, 2013; SAHRIS website). A site investigation was thus triggered. The site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 2 October 2022. No fossiliferous outcrop was detected during the site visit. The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a Low significance in palaeontological terms. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, if fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO/site manager must report to 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 carry out by a paleontologist. Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

6.3.9 Issue 10: Traffic Impacts

Large developments are normally associated with an increase in construction vehicle traffic. The main question which needs to be addressed is:

"How will the proposed development impact on the traffic on main delivery routes to the site?"

According to the Traffic Impact Assessment (Appendix D8) The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Highveld Solar PV plant were identified and assessed.

The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and to be found to be able to be accommodated by the road network.

During operation, it is expected that maintenance and security staff will periodically visit the facility and the generated trips can be accommodated by the external road network. The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be of negative low significance after mitigation. The traffic generated during the decommissioning phase will be similar to or even less than the construction phase traffic and the impact on the surrounding road network will also be considered to be of negative low significance after mitigation.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Dust suppression of internal gravel roads and the access roads.
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods.
- A "dry run" of the preferred route. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor.
- Design and maintenance of the internal gravel roads and maintenance of the access roads.
- If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines along the proposed routes will have to be moved (to be arranged by haulage company) or raised to accommodate the abnormal load vehicles.

The construction and decommissioning phases of a solar PV facilities are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is of temporary nature, i.e., the impact of the solar PV facility on external traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

From a transport engineering perspective, the proposed development alternatives (i.e., electrical infrastructure compound location alternatives and the technology options for the BESS) are acceptable as they do not have any impact on the traffic on the surrounding road network.

The proposed access points to the proposed Highveld Solar PV site have been assessed from a traffic engineering perspective and was found to be acceptable.

6.3.10 Risk Assessment for battery storage system

Battery storage facilities are a relatively new technology, particularly in South Africa. Batteries, as with most electrical equipment, can be dangerous and may catch fire, explode or leak dangerous pollutants if damaged, possibly injuring people working at the facility or polluting the environment. Common failure scenarios of Li-ion batteries include: electrical, mechanical, and thermal. The potential hazards associated with them are fire with consequent emission of gas and explosion. The major risks include thermal runaway, difficulty of fighting battery fires, failure of control systems and the sensitivity of Li-ion batteries to mechanical damage and electrical transients.

As with any fire or explosion, a potential consequence of Li-ion battery fires is the endangerment of life and property. These consequences are assessed based on their severity and likelihood. First, the severity of this consequence changes based on the quantity of cells in a system, as well as the system's proximity to people and property. Therefore, the size and location of the installation should be taken into consideration. For the Highveld SPP the location of the BESS and the fact that the area is sparsely populated will reduce the risk associated with toxic chemicals, flammability and overpressure from explosions. The risk level is seen to be of a low risk that is unlikely to occur with the proper safety measures taken as mitigation. Provided that the facility is designed and managed properly, and the batteries are handled in the manner prescribed by the manufacturer, an incident is unlikely to happen. However, because of the risk, special management actions are recommended in the EMPr to reduce the risk of an incident and manage an incident should one ever occur.

6.4 SENSITIVITY ANALYSIS

The sensitivity analysis undertaken as part of the BAR focusses on providing an understanding of the environmentally sensitive areas and features identified within the development footprint proposed for the SPP, as well as the grid connection corridor(s). This section considers the findings of each of the independent specialist studies undertaken for the development and describes the sensitive features and areas identified, including the location, the sensitivity rating of the features or areas as well as the associated buffers recommended by the specialist (where a buffer is considered to be relevant). The sensitive areas and features identified are also displayed on the sensitivity map included as Figure H1-H5 of this BA report.

The following points below provide the sensitivity analysis for the Highveld Solar Power Plant:

<u>Ecology:</u>

The Terrestrial Biodiversity Impact Assessment (refer to Appendix D1) has considered the features present within the development footprint and has made the following observations in this regard:

- Majority of the site has a low to medium sensitivity rating.
- The rocky outcrop has a High Sensitivity due to its importance as fauna habitat and potential red listed plant species habitat.
- The wetlands have a high sensitivity and should be preserved as important fauna and flora habitats.

Within the remaining areas of the SPP development footprint the specialist has indicated that all areas are appropriate for development, however with some areas requiring the implementation of stricter mitigation and management measures.

Wetlands / Riparian Areas:

The Wetland / Riparian Impact Assessment (refer to Appendix D1) nine HGM units were identified and assessed within the project area of influence. These comprise of three channelled valley bottoms, three unchanneled valley bottom wetlands and three hillslope seep wetlands. The wetlands scored an overall PES scores ranging from C – "Moderately Modified" to E "Critically Modified" due to the modification to both the hydrology and vegetation of the wetlands through anthropogenic activities. The wetlands scored "Moderate" importance and sensitivity scores due to the high protection level of both the wetland vegetation and units. The average ecosystem service score was determined to range between "Low" and "High". A 15 m post mitigation buffer was assigned to the wetland systems for both the PV area as well as the powerline corridor.

With the avoidance of the sensitive wetland features the development can be considered as appropriate from an environmental perspective.

Avifauna:

No specific areas of sensitivity have been identified from an avifauna perspective (Avifauna Impact Assessment, Appendix D2).

Therefore, from an avifauna perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Visual:

No specific areas of sensitivity have been identified from a visual perspective (Visual Impact Assessment, Appendix D3). Therefore, from a visual perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Heritage:

No sites, features or objects of cultural significance from the Stone Age, Iron Age or the historic period were identified on site.

Therefore, no specific features of sensitivity have been identified from a heritage perspective.

Palaeontology:

No palaeontological no-go areas have been identified for the project (Palaeontological Impact Assessment, Appendix D6).

Social:

No specific areas of sensitivity have been identified from a social perspective (Social Impact Assessment, Appendix D7). Therefore, from a social perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Traffic:

No specific areas of sensitivity have been identified from a traffic perspective (Traffic Impact Assessment, Appendix D8). Therefore, from a traffic perspective, no areas/road aspects have been identified as no-go for the development of the SPP and associated infrastructure.

Agriculture:

The agricultural sensitivity of the SPP, and the two grid connection corridor options have been confirmed as being of a **moderate** sensitivity (Soil and Agricultural Assessment, Appendix D9). The site has low agricultural potential due to soil constraints, including shallow soils, which makes the site unsuitable for cultivation, but suitable for grazing. Therefore, the agricultural land use (outside of the irrigated areas) is limited to grazing. No specific areas of sensitivity have been identified by the specialist that needs to be considered for the placement of infrastructure. Therefore, from an agricultural perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

6.5 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 6.7.

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.

6.5.1 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 6.7: 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.

7 CUMULATIVE EFFECTS ASSESSMENT

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

Appendix 1. (3)(i) An BAR (...) must include-
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts.

7.1 INTRODUCTION

The EIA Regulations (as amended) 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 Basic Assessment 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. 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 site 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 and Figure G.

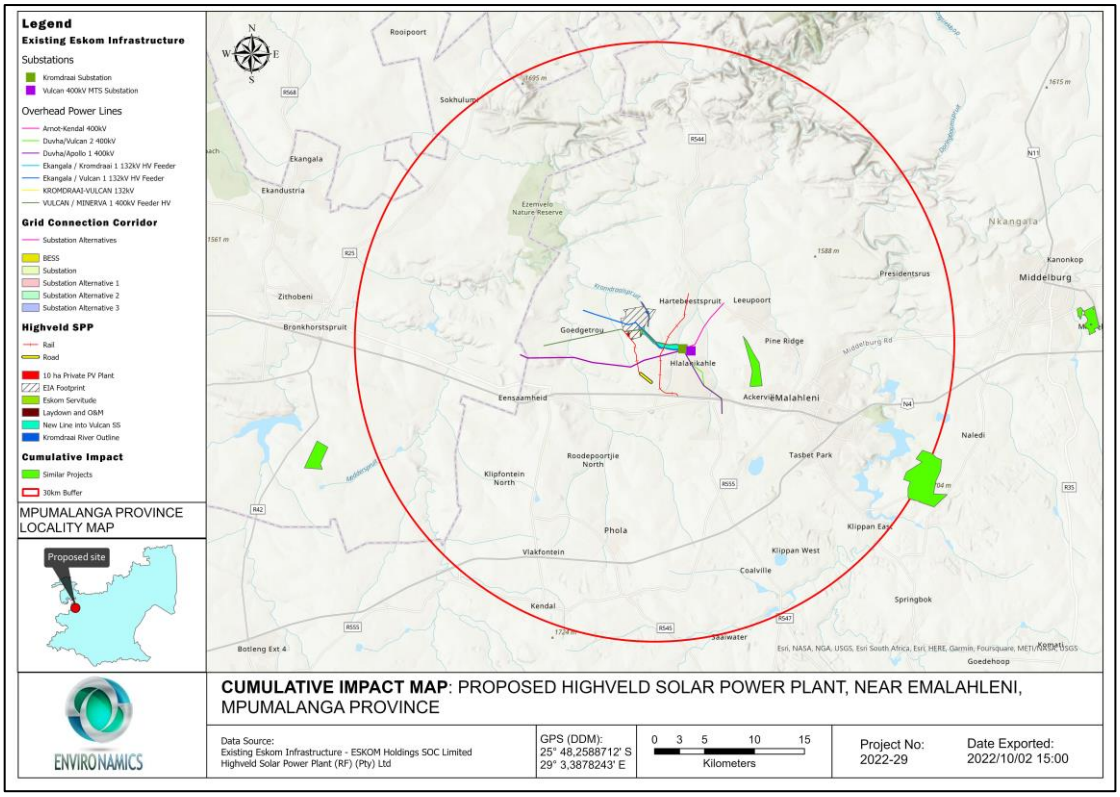


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites

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 Mpumalanga Province and North West Province. 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 this cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2023 and extending over 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

The following section provides details on existing projects, and projects being proposed in the geographical area of evaluation.

7.4.1 Existing projects in the area

According to the DFFE's database two (2) PV solar plant applications (of which two applications have lapsed) have been submitted to the Department within the geographic area of investigation, – refer to Table 7.1. It should be noted that there is uncertainty with regards to the accuracy and validity of the information obtained from the Departments database as regular updates are not always applied as the status of projects change.

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

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Samancor Chrome	11km	45 MW	12/12/20/1866	Scoping and EIA	Approved
ESKOM Duvha power station	29km	24 MW	14/12/16/3/3/2/759	Scoping and EIA	Approved

It is unclear whether other projects not related to renewable energy is to be constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development may take place within the general area.

7.4.2 Projects 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 two (2) applications have been submitted for renewable energy projects within the geographical area of investigation.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided, 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 a process flow. The following sections present their findings.

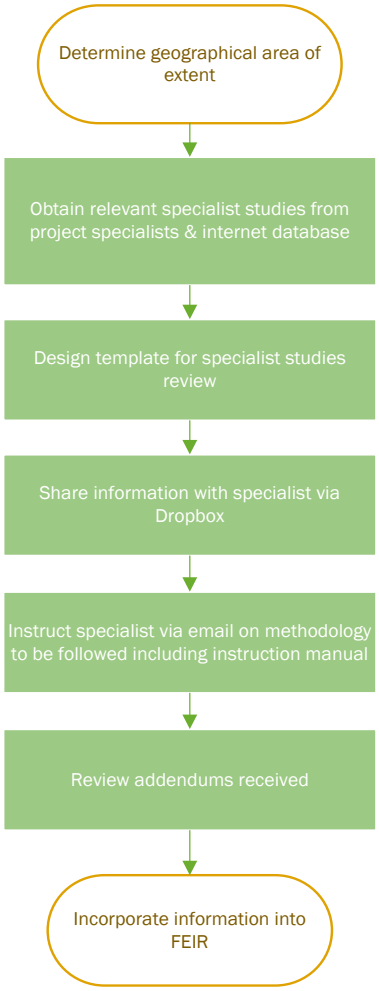


Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Soil, Land Capability and Agricultural Potential

According to the Agriculture Potential Assessment (Appendix D4) the most important concept related to 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.

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of lower potential agricultural land in a region which has been designated as a REDZ, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country.

The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard best practice mitigation management actions included in the EMPr (Appendix F). If the risk for each individual development is low, then the cumulative risk is also low.

Due to 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.

Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact cannot exceed acceptable levels of change in terms of agricultural land loss, no matter how much grid infrastructure exists. The cumulative impact of the grid infrastructure is therefore also assessed as negligible.

7.5.2 Terrestrial Biodiversity Impact Assessment

The Terrestrial biodiversity Impact Assessment (Appendix D1) In order to spatially quantify the cumulative effects of the proposed development, the project footprint is compared with the overall effects of surrounding development (including total transformation, and transformation as a result of new and proposed developments of a similar type, i.e., solar). Note that this spatial assessment is only conducted for the proposed solar development footprint area, the powerline area is omitted.

According to the 2018 National Biodiversity Assessment, the total amount of Rand Highveld Grassland habitat within 30 km of the PAOI amounts to 175 612 ha, but when considering the transformation that has taken place within this radius – only 89 290 ha remains. Therefore, the area within 30 km of the project has experienced approximately 49.2% loss in natural highveld grassland habitat.

The PV project footprint is 500 ha, and there are no other existing or approved PV projects that lie within the 30 km region that will remove intact Rand Highveld Grassland (as per the latest South African Renewable Energy EIA Application Database).

This means that the total amount of remaining habitat lost as a result of all existing and/or approved solar projects in the region, including the proposed Highveld PV development, amounts to 0.5% (the sum of all related developments as a percentage of the total remaining habitat).

Although a significant amount of the local vegetation type has already been lost, the proposed development is the only one of its kind within 30 km, and no key habitat corridors would be lost. Thus, the overall cumulative impact of the proposed project is rated as ‘Low’.

7.5.3 Avifaunal Assessment

The Avifauna Impact Assessment (Appendix D2) Cumulative impacts are assessed within the context of the extent of the proposed PAOI other developments and activities in the area (existing and proposed) and general habitat loss and disturbance resulting from any other anthropogenic activities in the area. The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in

isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on the local and regional avifauna community.

Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, other solar PV facilities, and power infrastructure). Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

The total area within the 30 km buffer around the PAOI amounts to 356472.98 ha, but when considering the transformation (189422.9 ha) that has taken place within this radius, 167050.11 ha of intact habitat remains according to the 2018 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 53.13 % loss in natural habitat. Considering this context, the PAOI is 3859.43 ha (according to the provided layout, along with the 2 km EGI buffer), and similar project exists in the 30 km region measuring a maximum of 1894.1 ha (as per the latest South African Renewable Energy EIA Application Database). This means that the total amount of remaining habitat lost as a result of solar projects in the region amounts to 9.6% (the sum of all related developments as a percentage of the total remaining habitat)

Approximately 53.13% of the habitat has already been lost, and as discussed above the proposed solar developments will result in a cumulative loss of approximately 9.6 % from only similar developments (Solar, approved and in process) in the area, as such the cumulative impact from the proposed development is rated as "high", with overall medium significance (Figure 7-2). This is further supported by the VU threat status of the ecosystem and the poorly protected protection level. 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.

7.5.4 Social Impact Assessment

The Social Impact Assessment (Appendix D7) indicates that the potential for cumulative impacts to occur as a result of the surrounding projects, agricultural and mining activities are likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the area's sense of place.

Highveld 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 Highveld SPP alone.

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.

The positive cumulative impacts will be of a medium significance and the negative cumulative impacts will also be of a medium significance.

7.5.5 Visual Impact Assessment

The Visual Impact Assessment (Appendix D3) indicates that the proposed development is located in a close proximity of existing Eskom power infrastructure and mines and will have a cumulative impact on viewers. Other SPPs are also proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore likely. The visual landscape mainly consists of agricultural and mining developments. Permanent residents of the area might be desensitised to industrial development due the large number of mining developments, thus, the PV plant will “blend” in with the area. The location of the SPPs within the REDZ will contribute to the consolidation of SPP structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

The significance of the cumulative visual impacts is medium.

7.5.6 Heritage Impact Assessment

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 Highveld Solar Power Plant project is located in an area with a very low presence of heritage sites and features.

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 in the area of the proposed for development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

The cultural heritage profile of the larger region is very low. 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 (Orton 2016). In addition to the Stone Age profile, there is also the Iron Age element

For the project area, the impacts to heritage sites are expected to be of medium significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.

7.5.7 Paleontological Impact Assessment

In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm developments may take place within the general area. The SPPs are all underlain by similar geology and therefore the Impact on these developments will be similar.

The palaeontological cumulative impacts have been assessed as being of a low significance.

7.5.8 Traffic Impact Assessment

The Traffic Impact Assessment (Appendix D6) indicates that depending on the timing of the other nearby renewable energy projects, where construction in particular could overlap, the 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 Highveld 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. Specific VECs have been 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 Impact Assessment	Habitat destruction and Fragmentation	Clearing of vegetation for construction of infrastructure, access roads etc. will be undertaken	- Medium
	Soil erosion and sedimentation	Topsoil and subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in wetlands will occur due to the construction activities	- Low
	Dust pollution	Exposure of soils to rainfall and wind during construction will result in dust pollution	- Medium
	Spillages of harmful substances	The operation and presence of heavy machinery and vehicle movement on site results in a risk for spillages	- Low
	Spreading of alien invasive species	Continued movement of personnel and vehicles on and off the site during the construction phase, as well as occasional delivery of materials required for maintenance, may result in the establishment and spreading of alien invasive species	- Low
	Negative effect of human activities on fauna and flora and road mortalities on fauna	Construction of infrastructure and the use of access roads etc. will have a negative effect on fauna and flora	- Low

Wetland / Riparian Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone (road crossings etc.)	Clearing of vegetation for construction of infrastructure, access roads etc. may result in an impact or change to the characteristics of water features present	- Medium
	Soil erosion and sedimentation	Topsoil and subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation in wetlands is expected where these sensitive water features are present The use of heavy machinery during the construction 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. 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.	- Medium
	Water pollution of the wetland features through 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 (heavy machinery and vehicle movement on site). 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 in wetland features	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 displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Medium
	Displacement of resident avifauna	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Low
	Loss of important avian habitats	The loss of important avian habitats through increased disturbance are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Medium

Agricultural Compliance Statement	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	Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries and indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment.	The cultural heritage profile of the larger region is very low. 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 (Orton 2016). In addition to the Stone Age profile, there is also the Iron Age element. 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. For the project area, the impacts to heritage sites are expected to be of medium significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.	- Low
Palaeontological Impact Assessment	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm developments may take place within the general area. The SPPs are all underlain by similar geology and therefore the Impact on these developments will be similar. Outcrops of weathered to well-preserved stromatolites were discovered on the whole development footprint.	- Medium
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Highveld 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,	+ Medium

		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 Highveld SPP alone.	
	Impact of 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	Overall increase in traffic during the lifetime of the different renewable energy facilities, located within a 30 km radius from the Highveld Solar Power Plant	Depending on the timing of the other nearby renewable energy projects, where construction in particular could overlap, the 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 cumulative impact and significance of the various nearby renewable energy projects is considered to have a low/ negligible impact	- Low
Operational Phase			
Terrestrial Biodiversity, Plant and	Habitat destruction and Fragmentation	Clearing of vegetation for as part of operation and maintenance	- Medium
	Soil erosion and sedimentation	Increased hardened surfaces around infrastructure and exposed areas	- Low

	Dust pollution	Vehicle movement on site for maintenance	- Medium
	Spillages of harmful substances	Vehicle movement on site for maintenance	- Low
	Spreading of alien invasive species	Vehicle movement on site for maintenance	- Low
	Road mortalities of fauna / impact of human activities on site	Vehicle movement on site for maintenance	- Low
Wetland / Riparian Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone	Clearing of vegetation for operation and maintenance of support infrastructure, access roads etc.	- Medium
	Soil erosion and sedimentation	Increased hardened surfaces around infrastructure and exposed areas during operation	- Low
	Spread and establishment of alien invasive species	Continued movement of personnel and vehicles on and off the site for maintenance, 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.	- Medium
	Spillages of harmful substances (water pollution)	Vehicle movement on site for maintenance purposes, as well as equipment	- Low
Avifaunal Impac	Collisions when flying into power line infrastructure	Collisions with power line infrastructure leading to injury or loss of avian life are cumulative impacts due	- Medium

		to the large number of planned solar developments and the associated power lines in a 30 km radius.	
	Electrocutions when perched on power line infrastructure	Electrocutions when perched on power line infrastructure are cumulative impacts due to the large number of planned solar developments and associated power lines in a 30 km radius.	- Medium
Visual Impact Assessment	Visual impacts related to the SPP and power line	The anticipated cumulative visual impact of the proposed SPP is expected to include the change in sense of place, as well as the precedent being set for SPP in the area where currently there is only a precedent for agricultural and mining related activities. Due to the number of mines in the area, the scenic quality of the region is low, further construction and operation of the SPP in the area is likely to have a negative impact.	- Medium
Heritage Impact Assessment	Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries and indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment.	The cultural heritage profile of the larger region is very low. 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 (Orton 2016). In addition to the Stone Age profile, there is also the Iron Age element. However, this is located well outside the 30km radius, in the Vredefort Dome area and north of Klerksdorp. 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. For the project area, the impacts to heritage sites are expected to be of medium significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.	- Low
Decommissioning Phase			
Terrestria l – Biodivers	Improvement of habitat through revegetation / succession over time	Rehabilitation of site	- Low

	Soil erosion and sedimentation	Demolition of infrastructure / rehabilitation of site	- Low
	Spreading and establishment of alien invasive species	Demolition of infrastructure / rehabilitation of site	- Low
	Habitat degradation due to dust	Demolition of infrastructure / rehabilitation of site	- Medium
	Spillages of harmful substances	Vehicle movement on site for rehabilitation	- Low
	Road mortalities of fauna / impact of human activities on site	Vehicle movement on site for rehabilitation	- Low
Wetland / Riparian Assessment	Improvement of habitat through revegetation / succession over time	Rehabilitation of site	- Low
	Soil erosion and sedimentation	Demolition of infrastructure / rehabilitation of site	- Low
	Spreading and establishment of alien invasive species in wetlands	Demolition of infrastructure / rehabilitation of site	- Medium
	Spillages of harmful substances in wetlands	Vehicle movement on site for rehabilitation	- Low
Visual Impact Assessment	Visual Intrusion	The decommissioning of the PV plant and 132kV power line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads adjacent to site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to consider.	- Low
Other	Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

This chapter of the Basic Assessment Report addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. 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. All cumulative impacts will be of a medium or low significance.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
  - Habitat destruction and Fragmentation (- Medium)
  - Dust pollution (- Medium)
  - Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone (road crossings etc.) (- Medium)
  - Soil erosion and sedimentation (- Medium)
  - Displacement of priority avian species from important habitats (- Medium)
  - Loss of important avian habitats (- Medium)
  - Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study (- 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)
  - Dust pollution (- Medium)
  - Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone (- Medium)
  - Spread and establishment of alien invasive species (- Medium)
  - Avifauna collisions when flying into power line infrastructure (- Medium)
  - Electrocutions when perched on power line infrastructure (- Medium)
  - Visual intrusion (- Medium)
- Cumulative effects during the decommissioning phase:
  - Habitat degradation due to dust (- Medium)
  - Spreading and establishment of alien invasive species in wetlands (- Medium)

- Generation of waste (- Medium)

The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project is 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 Mpumalanga Province. No cumulative impacts with a high residual risk have been identified.

In terms of the desirability of the development of renewable energy, it may be preferable to incur a higher cumulative loss in such a region as this one (which has already been degraded by mining and agricultural activities), than to lose land with a higher environmental value elsewhere in the country. Also, the acceptable cumulative impacts expected will not result in a whole-scale change of the environment and therefore are considered to be acceptable, and considering the associated positive impacts associated with the development of solar energy facilities, the proposed facility is considered desirable.

8 ENVIRONMENTAL IMPACT STATEMENT

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

Appendix 3. (3) An BAR (...) must include-

(l) an environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:

(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;

(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;

(o) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which were addressed in this final BA report. The ratings provided gives an indication of the impact significance with the implementation of the recommended mitigation measures. The environmental issues with a low negative rating were not included in the list below.

- Impacts during construction phase:
  - Direct habitat destruction (- Medium)
  - Habitat fragmentation (- Medium)
  - Impact on the characteristics of the watercourse – i.e. flow regime, habitat, biota, water quality and geomorphology due to disturbance within the floodline (- Medium)
  - Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study (- Medium)

- Direct and indirect employment opportunities and skills development (+ Medium)
- Economic Multiplier effect (+ Medium)

➢ Impacts during the operational phase:

- Direct habitat destruction (- Medium)
- Habitat fragmentation (- Medium)
- Impact on the characteristics of the watercourse – i.e. flow regime, habitat, biota, water quality and geomorphology due to disturbance within the floodline (- Medium)
- Collision when flying into power line infrastructure (- Medium)
- Electrocution when perched on power line infrastructure (- Medium)
- Increased financial security for farming operations (+ Low)
- Direct and Indirect employment opportunities and skills development (+ Medium)
- Development of non-polluting, renewable energy infrastructure (+ Medium)
- Contribution to Local Economic Development (LED) and social upliftment (+ High)
- Impact on tourism (+/- Low)

➢ Impacts during the decommissioning phase:

- Improvement of habitat through revegetation / succession over time (+ Medium)
- Soil erosion and sedimentation (- Low)
- Impact on the characteristics of the watercourse – i.e. flow regime, habitat, biota, water quality and geomorphology due to disturbance within the floodline (- Medium)

➢ The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. The cumulative impacts will not result in large scale changes and impacts on the environment.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the final layout of the Highveld Solar Power Plant through identifying specific environmental areas and features present within the site which needs to be avoided through the careful placement of infrastructure as part of the development footprint. Refer to Section 6.4 for the complete sensitivity analysis and Appendix H for the final layout map which avoids the areas required to be conserved.

The main features to be avoided are related to wetlands. The sensitive wetland features identified by the specialists have been avoided by the layout with a 15m buffer as indicated in Figure H4.

Further mitigation measures for the development, as recommended by the independent specialists, have been included in the EMPr(s) for the project as per Appendix F1-F4.

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- PV Panel Array - To produce up to 300MW, 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 Central 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. Whilst Highveld Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with the existing Eskom Vulcan 400kV MTS Substation. The connection power line will be constructed within the limits of the grid connection corridor assessed within the 250m wide (up to 690m in some instances) grid connection corridor. Project will inject up to 300MW into the National Grid. The installed capacity will be approximately 329MW.

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

- Supporting Infrastructure – The following auxiliary buildings will be within a 5.74ha Operations and Maintenance laydown area with basic services including water and electricity will be required on site:

    - Office
    - Switch gear and relay room
    - Staff lockers and changing room and
    - Security control

- Battery Energy Storage System – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m^3 of batteries and associated operational, safety and control infrastructure.

- Roads – Access will be obtained via an unnamed road off of the N4 to the south of the site and via another unnamed road to the east of the site. Three access points are proposed access by the Substation and O&M area 1, access to the South entrance of the site and access to the north portion. 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 properties. Fencing with a height of 2.5 meters will be used

8.4 RECOMMENDATION OF EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the BA report. In terms of the legal requirements it is concluded that:

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended)
- The Basic Assessment process has been conducted as required by the EIA Regulations (as amended), Regulations 19 and Appendix 1.
- The EMPr was compiled in conjunction with the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
- The EMPr was compiled in conjunction with the Generic EMPr for the development of the associated substation infrastructure for transmission and distribution of electricity as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
- The EMPr was compiled for the Highveld Solar Power Plant as per Appendix 4 of the EIA Regulations (GN.R. 326), published in Government Gazette 40772 on 07 April 2017.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level, no impacts of a high significance are relevant following the implementation of the recommended mitigation measures.

In terms of the contents and substance of the BA report the EAP is confident that all key environmental issues were identified, assessed and mitigation measures recommended for. These key issues have been adequately assessed during the BA process to provide the competent authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP 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 further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is

proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Highveld Solar Power Plant and associated infrastructure on Portion 17 of the Farm Kleinwater No. 301, Remaining Extent of Portion 2, Remaining Extent of Portion 15, Portion 47 and Portion 48 of the Farm Kromdraai No. 279, Registration Division Witbank, Mpumalanga Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr(s).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPr(s) should not be neglected and a copy of the EMPr(s) should be made available onsite at all times.
- The wetlands, and the recommended 15m buffer must be avoided and no disturbance must take place within these areas.
- The "Rocky Outcrop" habitat must be avoided by the layout for the facility.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

We trust that the department finds the report in order and eagerly await your comment and input in this regard.

Lisa de Lange (Opperman)

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9 REFERENCES

ANON. nd. Guidelines for Environmental Impact Assessments. http://redlist.sanbi.org/eiaguidelines.php

ACTS see SOUTH AFRICA

BODEN, T.A., G. MARLAND, and R.J. ANDRES. 2011. Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A.

BOTHA, J. 2022. Visual Impact Assessment – The Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

BOTHA, J. 2022. Social Impact Assessment - The Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

BUTLER, E. 2022. Palaeontological Impact Assessment for The Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

CONSTITUTION *see* SOUTH AFRICA. 1996.

DEPARTMENT OF ENERGY (DoE). Integrated Resource Plan 2010-2030

DEPARTMENT OF MINERALS AND ENERGY (DME). 2003. White Paper on Renewable Energy.

DIVYA, K.C. AND ØSTERGAARD, J., 2009. Battery energy storage technology for power systems—An overview. *Electric power systems research*, *79*(4), pp.511-520.

FIRST SOLAR. 2011. PV Technology comparison.

ENERGY BLOG. 2015. Energy Blog – Project Database. [Web:] http://www.energy.org.za/knowledge-tools/project-database?search=project lookup&task=search [Date of assess: 28 September 2015].

EMALAHLENI LOCAL MUNICIPALITY. EMalahleni Local Municipality Integrated Development Plan for 2020 – 2021.

MUCINA, L. AND RUTHERFORD, M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

NATIONAL DEPARTMENT OF AGRICULTURE. 2006. Development and Application of a Land Capability Classification System for South Africa.

NERSA. 2009. South Africa Renewable Energy Feed-in Tariff (REFIT) – Regulatory Guidelines.

SANBI. 2016. Guidelines for Environmental Impact Assessments. [Web:] http://redlist.sanbi.org/eiaguidelines.php. Date of access: 26 April 2016.

SOLARGIS. 2021. Global Horizontal Irradiation (GHI). [Web:] https://globalsolaratlas. info/ download/south-africa [Date of access: 04 May 2021].

SOUTH AFRICA(a). 1998. The Conservation of Agricultural Resources Act, No. 85 of 1983. Pretoria: Government Printer.

SOUTH AFRICA. 1996. Constitution of the Republic of South Africa as adopted by the Constitutional Assembly on 8 May 1996 and as amended on 11 October 1996. (B34B-96.) (ISBN: 0-260-20716-7.)

SOUTH AFRICA(a). 1998. The National Environmental Management Act, No. 107 of 1998. Pretoria: Government Printer.

SOUTH AFRICA(b). 1998. The National Water Act, No. 36 of 1998. Pretoria: Government Printer.

SOUTH AFRICA. 1999. The National Heritage Resources Act, No. 25 of 1999. Pretoria: Government Printer.

SOUTH AFRICA. 2004. The National Environment Management: Air Quality Act, No. 39 of 2004. Pretoria: Government Printer.

SOUTH AFRICA(a). 2008. The National Energy Act, No. 34 of 2008. Pretoria: Government Printer.

SOUTH AFRICA(b). 2008. The National Environmental Management: Waste Act, No. 59 of 2008. Pretoria: Government Printer.

SOUTH AFRICA. Minister in the Presidence: Planning. 2009. *Medium Term Strategic Framework. – A Framework to guide Governments Programme in the Electoral Mandate Period 2009-2014*.

SOUTH AFRICA. 2010. Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998. (GNR. 543, 544 and 545. 2010.). Pretoria: Government Printer.

SWINGLER, S. 2006. Statistics on Underground Cable in Transmission networks, Final Report of CIGRE Working Group B1.07.

TBC. 2022. Avifauna Assessment for the Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

TBC. 2022. Terrestrial Biodiversity Assessment for the Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

TBC. 2022. Wetland Baseline and Risk Assessment for the Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

TBC. 2022. Agricultural Assessment for the Proposed Highveld Solar Power Plant near Witbank, Mpumalanga Province.

THE MESOTHELIOMA CENTRE. 2016. Mesothelioma in South Africa. [Web:] http://www.asbestos.com/mesothelioma/south-africa/. [Date of access: 27 June 2016].

VAN SCHALKWYK, J. 2022. Cultural Heritage Impact Assessment: The Proposed Highveld Solar Power Plant Near Witbank, Mpumalanga Province.

WINK, I. 2022. Traffic Impact Study for the transportation of Solar Energy Equipment to the Highveld Solar Power Plant near Witbank, Mpumalanga Province

WORLD BANK GROUP. 2006. The Equator Principles.