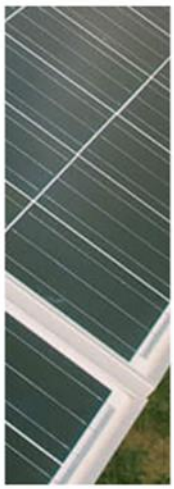
ENVIRONMENTAL IMPACT REPORT

Final – 06 June 2023

THE PROPOSED 20MW SOLAR FACILITY LOCATED ON THE REMAINING EXTENT OF THE FARM VOGELSRAND NO. 373 NEAR HENNENMAN, FREE STATE PROVINCE



ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No. : 14/12/16/3/3/2/2233

Project Title : The proposed 20MW solar facility located on the Remaining Extent of the Farm Vogelsrand No. 373 near Hennenman, Free State Province

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Client : DPT Hennenman (Pty) Ltd

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GLOSSARY OF TERMS AND ACRONYMS

BESS	Battery Energy Storage System
BID	Background Information Document
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects
GNR	Government Notice Regulation
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage

MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
PPP	Public Participation Process
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SR	Scoping Report
SPP	Solar Power Plant
VU	Vegetation Unit

CONTEXT FOR THE DEVELOPMENT

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

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix for offtake by third parties and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DMRE (Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 IRP Update, 2010-2030), over the short term (of the next two or three years), clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000 MW from 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 either form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or the electricity generated by the facility will be wheeled into the national grid for offtake by third parties as part of other generation opportunities[1]. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

[1] Should the 20MW Solar Facility not be successful in the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) process it could also be used for private off-take. However, the Applicant confirms that the main intention is to bid the proposed developments as part of the REIPPP Programme. Government Gazette No. 44989, dated 12 August 2021, amended the threshold for self-generation facilities from 1MW to 100MW. This amendment allows an Independent Power Producer (IPP) of up to 150MW to sell electricity to an end-user customer who consumes the power itself.

In response to the above, DPT Henneman (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 the Remaining Extent of Farm Vogelsrand No. 373, Registration Division Ventersburg, situated within the Matjhabeng Local Municipality area of jurisdiction, Free State Province (refer to Figure A for the locality map). The project entails the generation of 20 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will be approximately 53 hectares (including supporting infrastructure on site and including the overhead power line) within the 70 hectares identified and assessed as part of the Environmental Impact Assessment process, which is located within the affected property. From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2118 kwh/m^2.

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Matjhabeng Local Municipality faces a number of challenges in addressing the needs of sustainable growth and improved quality of life (SDF, 2021). The Matjhabeng Local Municipality Spatial Development Framework (2020/2021- 2024/2025) identifies specific threats and weaknesses experienced in the municipal area which includes lack of proper infrastructure, poor maintenance of infrastructure, lack of financial governance, lack of employment opportunities, lack of bulk services, uncontrolled development and lack of skills development, to name a few.

The Matjhabeng Local Municipality's Integrated Development Plan (IDP, 2022-23) identifies the goals of the municipality as improved efficiency and effectiveness of the municipal administration, improved provision of basic and environmental services in a sustainable way to our communities, increased economic growth, improve community confidence in the system of local government and enhanced financial viability and improved financial management. The IDP considers the economic structure and performance and how the municipality relies heavily on the agricultural sector and the general decline of the sector. It indicates that alternative sectors to the declining sectors of the area needs to be explored, which includes the renewable energy sector.

DPT Henneman (Pty) Ltd intends to develop a 20MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of Farm Vogelsrand No. 373, Registration Division Ventersburg, situated within the Matjhabeng Local Municipality and Lejweleputswa District Municipality area of jurisdiction, Free State Province. The town of Henneman is located approximately 4km southeast of the proposed development (refer to Figure A and B for the locality and regional map). The total footprint of the project will approximately be 53 hectares (including all associated and supporting infrastructure on site), with a larger are of 70 hectares under assessment for the placement of the footprint. The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access via a main road (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase). The site was therefore provided by the Applicant for assessment as part of the EIA process and for development of the 20MW solar facility.

The desirability of the site was confirmed as part of the Scoping Phase which is based on the site providing an opportunity for the appropriate placement of infrastructure within the affected environment, without resulting in detrimental negative environmental impacts.

The development footprint is therefore under assessment as part of this Final EIA Report and has also been considered by the independent specialists.

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 solar energy facility. The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – a) temporarily required to allow for maintenance of existing infrastructure; b) 2 kilometres or shorter in length; c) within an existing transmission line servitude; and d) will be removed within 18 months of the commencement of development."*

- Activity 12(ii)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse, excluding – (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applied; (cc) activities listed in activity 14 in Listing Notice 2 od 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared."*

- 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 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes 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, excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes."*

- 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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure."*

- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan."*

- Activity 10 (b)(i)(ee)(gg)(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 Free State, (i) outside urban areas,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, (gg) areas within 10 kilometers from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA… and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 12 (b)(i)(ii)(vi) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation, except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan, (b) in the Free State, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 14(ii)(c)(b)(i)(ff)(hh) (GN.R 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within 10 kilometers from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA…."*

Activities required for the development of the solar facility which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 and 324) implies that the development could potentially have an impact on the environment that will require mitigation. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24 of the EIA Regulations in order to obtain Environmental Authorisation. Environamics has been appointed as the independent consultant to undertake the Environmental Impact Assessment (EIA) on behalf of DPT Hennenman (Pty) Ltd.

Regulation 21 of the EIA Regulations requires that an Environmental Impact Report (EIR) must contain the information set out in Appendix 3 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 3 of GNR326 requires a full description of the process undertaken to identify, assess and rank the impacts that the activity and associated structures and infrastructure

will impose on the preferred sites, the scope of the assessment, and the consultation process undertaken be set out in the EIR report.

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

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 12 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation and socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and temporary increase in traffic disruptions and movement patterns.

Impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 35 years. The negative impacts are generally associated with habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats and collision of avifauna with PV panels. The provision of sustainable services delivery needs to still be confirmed. The operational phase will have a direct positive impact (albeit to a limited extent) through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development and social upliftment.

Impacts during the decommissioning phase:

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

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of forestry, Fisheries and Environment database thirteen (13) other solar plants have been proposed in relatively close proximity to the proposed activity.

The potential for cumulative impacts may therefore exist. This Final EIA Report includes an assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase

relate to: habitat destruction, seasonal drainage channel degradation, displacement of priority avian species from important habitats, loss of important avian habitats, impacts of employment opportunities, business opportunities and skills development and impact associated with large-scale in-migration of people. Cumulative impacts during the operational phase relate to: habitat destruction and visual intrusion. The cumulative effect of the generation of waste was identified as being potentially significant during the decommissioning phase.

Regulation 23 of the EIA Regulations determine that an EIA report must be prepared and submitted for the proposed activity after the competent authority accepts the final Scoping Report, including the Plan of Study for the EIA phase. This EIA report evaluates and rates each identified impact and identify mitigation measures that may be required. This EIA report also contains information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Appendix 3 of the EIA Regulations.

This is the Final EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) for decision-making on the Application for Environmental Authorisation. The draft EIA report was distributed to the registered interested and affected parties (I&APs) for a 30-day review and comment period. The 30-day review and comment period was from 05 May 2023 to 05 June 2023.

1 INTRODUCTION

This section aims to introduce the Environmental Impact Report (EIR) and specifically to address the following requirements of the regulations:

Appendix 3. (3) An environmental impact assessment report contains 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 Environmental Authorisation (EA) from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 and 324) for the project implies that the development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. According to Appendix 3 of Regulation 326 the objective of the Environmental Impact Report (EIR) 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;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

- Determine the—
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

This report is the Final Environmental Impact Report (EIR) submitted to the Department of Forestry, Fisheries and the Environment for decision-making on the Application for Environmental Authorsation. According to Regulation 326 all registered I&APs and relevant State Departments must be allowed the opportunity to review and provide comment on the report. The Draft EIR was made available to registered I&APs and all relevant State Departments for a 30-day review period from **05 May 2023 to 05 June 2023**. These stakeholders and individuals were requested to provide written comments on the Draft EIR within the allocated timeframe. All issues raised and identified during this review period have been documented and compiled into a Comments and Response Report as part of this Final EIR (Appendix C6). All comments received during the Scoping Phase are available in the Comments and Response Report as referred to above, as well as Appendix C4 and C5 of this Final EIR.

The EIA Regulations No. 324, 325 and 327 outline the activities that may be triggered and therefore require EA. The listed activities, with special reference to the respective developments, that are triggered is included in Table 1.1.

Table 1.1: Listed activities[2]

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, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is –*

[2] Please refer to Table 6.2 for detailed description of the relevant aspects of the development that will apply to each specific activity.

		a) temporarily required to allow for maintenance of existing infrastructure; *b) 2 kilometres or shorter in length;* *c) within an existing transmission line servitude; and* *d) will be removed within 18 months of the commencement of development..”* • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132kV), an on-site HV/MV substation and switching station (132kV). It is expected that generation from the facility will tie in with the existing Kroonstad-Everest 132kV Power Line via a loop-in loop-out connection. The connection point is located within the site on the affected property.
GNR. 327 (as amended in 2017)	Activity 12(ii)(c)	• “*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse, excluding –* *(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applied;* *(cc) activities listed in activity 14 in Listing Notice 2 od 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such development occurs within an urban area;* *(ee) where such development occurs within existing roads, road reserves or railway line reserves; or* *(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.”* • Activity 12(ii)(c) is triggered based on the presence of a seasonal drainage channel located within the south of the site. The layout of the facility is located within 32m from the edge of the watercourse. The infrastructure that is located within 32m from the edge of the watercourse includes the

		facility fence, access roads and PV panels which forms part of the entire development footprint/facility layout. The development footprint of the solar power plant will be 53 ha / 530000 square meters in extent and therefore the infrastructure to be developed within 32m is more than 100 square meters.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres. Diesel and oil are required during the construction and operation phases for the undertaking of the required construction and operation phase activities, including that of the operation of equipment and machinery.
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, excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes."* • Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 53 ha in extent.
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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure."*

		• Activity 1 is triggered since the proposed photovoltaic solar facility will generate 20 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, excluding where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan."* • In terms of vegetation type the site falls within the Vaal-Vet Sandy Grassland which is described by Mucina and Rutherford (2006) as Endangered. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 53 ha in extent. A total of 530000 square meters will be cleared.
GNR. 324 (as amended in 2017)	Activity 10 (b)(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 (b) in the Free State, (i) outside urban areas, ,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 10(b)(i)(ee)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a capacity exceeding 30 but not exceeding 80 cubic metres. The project is located within the Free State Province and a section of the site is located within a CBA 1 area, as per the Free State Biodiversity Conservation Plan (2015). Furthermore, a seasonal drainage channel is located within the south of the site. Diesel and oil are required during the construction and operation phases for the undertaking of the required construction and operation phase activities, including that of the operation of equipment and machinery.

GNR. 324 (as amended in 2017)	Activity 12 (b)(i)(ii)(vi)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation, except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan, (b) in the Free State, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 12 (b)(i)(ii)(vi) is triggered since the proposed development is located in the Free State province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. In terms of vegetation type the site falls within the Vaal-Vet Sandy Grassland which is described by Mucina and Rutherford (2006) as Endangered. A section of the site is located within a CBA 1 area, as per the Free State Biodiversity Conservation Plan (2015). Furthermore, a seasonal drainage channel is located within the south of the site. The development footprint of the solar power plant will be 53 ha in extent. A total of 530000 square meters will be cleared.
GNR. 324 (as amended in 2017)	Activity 14(ii)(c)(b)(i)(ff)	• "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour, (b) within the Free State, (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)(c)(b)(i)(ff) is triggered based on the presence of a seasonal drainage channel located within the south of the site. A section of the site is located within a CBA 1 area, as per the Free State Biodiversity Conservation Plan (2015). The layout of the facility is located within 32m

		from the edge of the watercourse. The development footprint of the solar power plant will be 53 ha / 530000 square meters in extent.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person: Lisa De Lange (Opperman)

EAPASA Registration: 2020/2150

Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531

Telephone: 084 920 3111 (Cell)

Electronic Mail: lisa@environamics.co.za

And/or

Contact person: Carli van Niekerk

Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531

Telephone: 082 220 8651 (Cell)

Electronic Mail: carli@environamics.co.za

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

1.3 DETAILS OF SPECIALISTS

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

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Geotechnical Feasibility Assessment	Rocksoil Consult	JL Roux	Box 69027 Highveld 0169	Cell: 083 602 6734	info@rocksoilsoncult.co.za
Avifaunal Impact Assessment	Agreenco	ASH Haagner	PO Box 19896 Noordbrug, Potchefstroom 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Ecological and Wetland Impact Assessment	Enviroguard Ecological Services cc	Prof. L.R. Brown	-	Cell: 082 464 1021	envguard@telkomsa.net
Heritage Screening Report (including archaeology and palaeontology)	CTS Heritage	Jenna Lavin	34 Harries St, Plumstead, Cape Town, 7800	Cell: 082 303 7870/ 083 619 0854	info@ctsheritage.com
Agricultural Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal ,Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	phala.env@gmail.com
Social Impact Assessment	Donaway Environmental Consultants	Marelie Botha	30 Fouche Street Steynsrus, 9515	Cell: 082 493 5166	phala.env@gmail.com
Traffic Assessment Study	BVi Consulting Engineers	Liza Botha	Edison Square, Century City, 7441	Cell: 060 557 7467	lizab@bviwc.co.za

1.4 STATUS OF THE EIA PROCESS

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

- A pre-application meeting request and public participation plan was submitted to DFFE on 28 March 2022.
- The DFFE accepted the public participation plan in an email dated 05 May 2022.
- A newspaper advertisement was placed in the Vista Newspaper on 31 March 2022, informing the public of the EIA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 24 February 2022.
- Site notices were erected on site on 24 February 2022 informing the public of the commencement of the EIA process.
- An application form and the draft Scoping Report was submitted to DFFE on 11 November 2022.
- The draft Scoping Report was made available for a 30-day review and comment period from 11 November 2022 to 12 December 2022.
- The final Scoping Report was submitted to the DFFE for decision-making on 11 January 2023.
- The DFFE accepted the Final Scoping Report (FSR) on 20 February 2023 (Appendix G1).
- The Draft EIR Report was submitted to the DFFE (and registered I&APs) on 05 May 2023 for the 30-day review and comment period which was from 05 May 2023 – 05 June 2023.
- The Final EIR has been submitted to the DFFE for decision-making on the Application for Environmental Authorisation on 06 June 2023. This included an Amended Application for Environmental Authorisation.

It is envisaged that the EIA process should be completed within approximately four months of submission of the Final EIR, i.e., by August 2023 – see Table 1.3.

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

Activity	Prescribed timeframe	Timeframe
Site visit		24 February 2022
Public participation (BID)	30 Days	2 June – 4 July 2022
Submit application form and DSR	-	11 November 2022
Public participation (DSR)	30 Days	11 November – 12 December 2022
Submit FSR	44 Days	11 January 2023
Department acknowledges receipt	10 Days	January 2023
Department approves/reject	43 Days	20 February 2023
Public participation (DEIR)	30 Days	05 May – 05 June 2023
Submission of FEIR & EMPr	-	06 June 2023
Department acknowledges receipt	10 Days	June 2023
Decision	107 Days	September 2023
Department notifies of decision	5 Days	September 2023
Registered I&APs notified of decision	14 Days	September 2023
Appeal	20 Days	September/October 2023

1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORTS

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. Refer to Appendix D for the Site Verification Report.

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?	Confirmation / motivation
Agricultural Impact Assessment Sensitivity: High	Yes	An Agricultural Compliance Statement is included in Appendix E4. The high sensitivity is disputed by the report based on the current conditions of the site.
Landscape / Visual Impact Assessment Sensitivity: Very High	Yes	A Visual Impact Assessment is included in Appendix E3.
Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment (including consideration of the archaeology of the area) is included in Appendix E5.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Heritage Impact Assessment (including consideration of the palaeontology of the area) is included in Appendix E5.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	An Ecological Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment Sensitivity: Low	Yes	An Ecological Impact Assessment (which also considers wetlands) is included in Appendix E1. 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	The Civil Aviation Authority has been consulted regarding the development of the project since the commencement of the EIA Process. No specific negative impacts or issues have been raised to date by the CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity. Refer to Appendix D for the Site Verification Report.
Defence Assessment Sensitivity: Low	No	The sensitivity is low and therefore no assessment has been included. Refer to Appendix D for the Site Verification Report.
RFI Assessment Sensitivity: Low	No	The RFI theme sensitivity is low for the entire extent of the project. The South African Radio Astronomy Observatory (SARAO) has been consulted regarding the development of the project since the commencement of the EIA Process. No specific negative impacts or issues have been raised to date by the SARAO regarding the project. The project is also not located within an area considered to be of a high sensitivity. Refer to Appendix D for the Site Verification Report.
Geotechnical Assessment Sensitivity: Not indicated	Yes	A Geotechnical Feasibility Assessment (Preliminary Geotechnical Investigation) is included as Appendix E8.

Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E6.
Plant species Assessment Sensitivity: Low	Yes	An Ecological Impact Assessment is included in Appendix E1. 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	An Ecological Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

It must be noted that the DFFE Screening Tool Report indicates that the avian sensitivity for the site is of a low sensitivity, however an Avifaunal Impact Assessment is not indicated as being required for the proposed development. An Avifaunal Impact Assessment (Appendix E2) has however been undertaken for the development to ensure that the Environmental Impact Assessment process considers the impact of the developments on avifauna as per the requirements of the BirdLife South Africa Best Practice Guidelines for the development of solar energy facilities.

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 of Regulation No. 326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.5.

Table 1.5: Structure of the report

Requirements for the contents of an EIR as specified in the Regulations		Section in report
Appendix 3. (3) - An environmental impact 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 associated structures and infrastructure related to the development.	
(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
(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 development footprint within the approved site.	5
(h)	a full description of the process followed to reach the proposed development footprint within the approved site, including –	
	(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and	
	(x) a concluding statement indicating the preferred alternative development location within the approved site.	
	(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
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	

	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
(i)	a 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 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, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Not applicable
(o)	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
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8

(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;	
(r)	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;	8
(s)	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;	
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including-	Not applicable
	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	
	(ii) a motivation for the deviation;	
(v)	any specific information that may be required by the CA; and	Not applicable
(w)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

1.7 EIA REPORT REQUIREMENTS

The competent authority (DFFE) accepted the Final Scoping Report and approved the Plan of Study for the Environmental Impact Assessment on 20 February 2023. As part of the Acceptance of the Final Scoping Report, the Department provided a list of amendments and additional information that needs to form part of the EIA Report. The requirements from the Department are listed in Table 1.6 below. Furthermore, Table 1.6 provides an indication of where the requirements have been considered and met in the Final EIA Report.

Table 1.6: DFFE requirements for the EIA Report

Requirement	Section/Appendix where requirement has been met
(a) Listed Activities and Application Form	
It has been noted that for activity 11 of Listing Notice (LN) 1, the main activity refers to 11(ii) while the description indicates sub-activity 11(i). This inconsistency of the triggered listed activity and sub-activities must be rectified in the amended application form and final EIAr.	An amended Application Form has been submitted to the DFFE with the Final EIA Report. This error has been rectified in the Application form and this Final EIA Report.
It has been noted the listed activities under LN 3 have been triggered because the Critical Biodiversity Area (CBA 1) will be affected by the proposed development, however, in the description of the project, no mentioned on whether there are the systematic biodiversity plans adopted by the CA or bioregional plan in the area. Therefore, you are advised to provide clarity regarding the adopted systematic biodiversity plans adopted by the CA or bioregional plan to determine the applicability of this listed activity. Proof of such must be obtained from the relevant CA and be submitted with the amended application form and final EIAr.	It is confirmed that the CBA 1 areas have been identified as per the Free State Biodiversity Conservation Plan (2015). This is as per the information obtained from the Ecological Impact Assessment (Appendix E1). The project descriptions of the relevant listed activities triggered under Listing Notice 3 have been updated in the Amended Application Form and this Final EIA Report. All relevant information that could be obtained regarding the Free State Bioregional Plans have been included in Appendix G2-G4 of this Final EIA Report. From the information available, no bioregional plans are available and no confirmation could be obtained that a bioregional plan has been adopted. The metadata for the Free State Terrestrial CBA dataset obtained from SANBI has been included in Appendix G2-G4 to indicate where the data used to identify the CBAs were obtained, which refers to DESTEA as the Data Origin and Copyright Holder. No confirmation could be obtained from DESTEA regarding whether a bioregional plan has been adopted following an email request sent to the Department by Environamics in March of 2023. It is confirmed that the data partner of the 2015 Free State Terrestrial CBAs dataset, which falls under the 2015 Free State Biodiversity Plan, as available on the SANBI Biodiversity GIS Platform, is the Department of Economic, Small Business Development, Tourism and Environmental Affairs.

	Therefore, the request regarding the adoption of a bioregional plan cannot be confirmed as required by the DFFE due to a lack of information available and a lack of correspondence from DESTEA in this regard following the request from Environamics. Based on the above, the listed activities in Listing Notice 3 relating to the development within a CBA are applied for in terms of the information available to the EAP and the information available to the independent ecological specialist at this time.
It is noted on page 16 of the final SR and page 13 of 32 of the application form, when describing the proposed project that the width of internal roads will be up to 4m. The CA submits that in order for Activity 4 (b)(i)(ee)(gg) to be triggered, the road must be wider than 4 meters. Therefore, you are expected to clarify this and provide the relevant size of the roads in the amended application form and final EIAr.	It is confirmed that the width of of the internal roads will be up to 4m wide and therefore Activity 4 (b)(i)(ee)(gg) of Listing Notice 3 will not be triggered by the development. This activity has been removed from this Final EIA Report and the Amended Application Form submitted to the DFFE with the Final EIA Report.
Noting that activities 4, 10 and 14 of LN 3 are triggered because the project area is located approximately 5km from the Thabong Game Ranch. You are reminded to submit with the final EIAr a Section 50 approval in terms of NEM:PAA.	Section 50 of NEM:PAA refers to commercial and community development in nature reserves and world heritage sites. The site is located near the Thabong Game Ranch (5.3km from the site) but is not located within the Game Ranch. As there is no direct infringement, approval in terms of Section 50 of NEM:PAA is not relevant to the proposed development.
Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. In addition, the onus is thus on the applicant and the environmental assessment practitioner (EAP) to ensure that all the applicable listed activities are included in the application. Failure to do so may result in unnecessary delays in the processing of the application.	This Final EIA Report and the Amended Application include all relevant listed activities, and specific project descriptions have been provided which links the trigger of the listed activities to the proposed development.
If the activities applied for in the application form differ from those mentioned in the final EIAr, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms.	An Amended Application form has been submitted to the DFFE with the submission of this Final EIA Report for decision-making on the Application for Environmental Authorisation.

(b) Alternatives	
Page 45-53 of the final SR has provided a description of identified alternatives for the proposed development. Therefore, you are advised to make sure that the alternatives presented with the final EIAr, are feasible and reasonable, including the advantages and disadvantages that the proposed development or alternatives will have on the environment and on the community that may be affected by the development as per Appendix 2 of GN R.982 of 2014 (as amended). Further to that, preferred alternatives as well as details of why the preferred alternatives are deemed best suitable in comparison to the other alternatives must be clear.	The alternatives included in this Final EIA Report are feasible and reasonable for the development of the facility. The preferred alternative is indicated in Section 5.5 of this Final EIA Report. The positive and negative impacts (advantages and disadvantages) have been assessed in Section 6 of this Final EIA Report.
Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2.	The alternatives included in this Final EIA Report are feasible and reasonable for the development of the facility.
(c) Public Participation	
Please ensure that comments from all relevant stakeholders are submitted to the CA with the final EIAr. This includes but not limited to the Department of Forestry, Fisheries, and the Environment (DFFE): Biodiversity Planning and Conservation (BCAdmin@environment.gov.za); DFFE: Protected Areas; Department of Water and Sanitation; The Department of Water Affairs: Free State Regional Office; Free State Department of Economic Development, Tourism and Environmental Affairs; Department of Agriculture, Rural Development and Land Reform (DARDLR); World Wide Fund SA; South African National Roads Agency (SANRAL); Department of Police, Roads and Transport; Provincial Heritage Resources Agency (PHRA)- Free State, South African Heritage Resources Agency (SAHRA); Birdlife South Africa; Sentech Ltd, South African Radio Astronomy Observatory (SARAO); Department of Communications; ESKOM; Telkom SA SOC Ltd; African Framer Association of South Africa; Wildlife and Environment Society of South Africa (WESSA); South African National Parks; Endangered Wildlife Trust; South African Weather Service; Agri SA – Free State Agriculture; Surrounding Landowners; the Lejweleputswa District Municipality and Matjhabeng Local Municipality.	Comments have been sought from various stakeholders since the commencement of the EIA process as well as the draft EIA Report that was made available for a 30-day review and comment period from 05 May to 05 June 2023. All registered I&APs were notified of the availability of the draft EIA Report and access to the relevant documents for review and comment was provided. It is further confirmed that the stakeholders listed by the Department in the requirement are registered on the I&AP database included in Appendix C3 of this final Report and have therefore all received notification and an opportunity to review and comment on the respective documentation. This requirement has therefore been complied with.
Furthermore, ensure that all issues raised, and comments received during the circulation of the SR from registered I&APs and organs of state which have	All issues raised as part of the Scoping Phase and based on the draft Scoping Report was addressed in the draft EIA Report that was made available to I&APs

jurisdiction in respect of the proposed activity are adequately addressed in the final EIAr.	and Organs of State for a 30-day review and comment period. All comments received and raised during the 30-day review and comment period of the draft EIA Report have been recorded, considered, and addressed as part of this Final EIA Report to be submitted to the Department for decision-making on the Application for Environmental authorisation.
Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Proof of correspondence has been included in this Final EIA Report. All proof of correspondence undertaken during the Scoping Phase was included in the draft Report under Appendix C4 and was also documented in the Comments and Responses Report included as Appendix C6. The information is also included in this Final EIA Report. During the 30-day review and comment period of the draft EIA Report, reminders of the report availability were distributed to I&APs to attempt to obtain comment where comment is not submitted. Proof of such reminders is included in Appendix C4 of this Final EIA Report.
The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended.	The Public Participation Process has been conducted as per the requirements of the EIA Regulations, 2014, as amended. The tasks completed and undertaken as part of the Public Participation process are detailed in section 5.2 of this Final EIA Report. Proof of all tasks completed is included in Appendix C of this Final EIA Report.
All issues raised and comments received during the circulation of the final SR from I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the draft EIAr, including comments from this Department, and must be incorporated into a Comments and Response Report (CRR).	All issues raised as part of the Scoping Phase and based on the draft Scoping Report were addressed in the draft EIA Report that was made available to I&APs and Organs of State for a 30-day review and comment period. All comments received, including the comments from the Scoping Phase, were included in the Comments and Responses Report of the draft EIA Report as Appendix C6, and is included as part of this Final EIA Report..
The comments and response trail report (C&R) must be submitted with the draft EIAr. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Annexure 1 of this acceptance letter. Please refrain from summarising comments made by I&APs. All comments from	The Comments and Responses Report is included as Appendix C6 of this Final EIA Report, which includes all comments and responses relevant to the EIA process as received to date (i.e., since the commencement of the EIA process in November 2022).

I&APs must be copied verbatim and responded to clearly. Please note that a response such as "Noted" is not regarded as an adequate response to I&AP's comments.	All comments received during the 30-day review and comment period of the draft EIA Report has been recorded and responded to in the Comments and Responses Report (Appendix C6) of this Final EIA Report. The Comments and Responses Report is a separate document and is in table format. All comments are included verbatim, and appropriate and detailed responses are provided.
Minutes and attendance registers (where applicable) of any physical/virtual meetings held by the Environmental Assessment Practitioner (EAP) with Interested and Affected Parties (I&APs) and other role players must be included in the final EIAr.	The need for stakeholder engagement meetings have not been identified for this EIA process and therefore no meetings have been held. This comment is therefore not relevant.
The final EIAr, must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development.	Evidence of notification of the process and availability of the draft EIA report for the 30-day review and comment period from 05 May – 05 June 2023 is submitted to the DFFE with this Final EIA Report to ensure compliance with this requirement. Refer to Appendix C4 of this Final EIA Report.
(d) Layout & Sensitivity Maps	
Please ensure that the above map has a clear legend that communicate with details of the map.	All maps provided include a clear legend which corresponds with the details of the relevant maps provided.
Kindly provide a layout map which indicates the following: ➢ the PV development area, ➢ Position of all infrastructure e.g., panels, BESS, substations, grid connection etc, ➢ Permanent laydown area footprint, ➢ All supporting onsite infrastructure e.g., roads (existing and proposed), ➢ Substation(s) and/or transformer(s) sites including their entire footprint, ➢ Connection routes (including pylon positions) to the distribution/transmission network, ➢ All existing infrastructure on the site, ➢ The location of sensitive environmental features on site e.g., CBAs, heritage sites, wetlands, drainage lines etc. that will be affected,	The Layout and Sensitivity Map included in Figure G3 and the Preferred Layout Map included as Figure I complies with the requirements stipulated in the comment from the Department.

➢ Buffer areas; and ➢ All "no-go" areas.	
The above map must be overlain with a sensitivity map and a cumulative map which shows neighbouring renewable energy developments and existing grid infrastructure. All available biodiversity information must be used in the finalisation of the map and infrastructure must not encroach on highly sensitive areas as far as possible.	A Layout, Sensitivity and Similar Projects Map is included as Figure G4. All biodiversity information has been used on the sensitivity map included as Figure G2. A CBA Map is included as Figure G1.
Ensure that similar colours are not used to differentiate between infrastructure. i.e., items must be easily distinguishable in the legend.	The legend is easily distinguishable for the layout shown in Figure G3 and Figure I of this Final EIA Report.
Google maps will not be accepted for decision-making purposes.	Formal maps have been provided in the Final EIA Report as Figures A-I. ArcGIS has been used for the generation of these formal maps.
(e) Specialist assessments	
On page 30 of the Ecological Impact Assessment report, it is noted that "From a plant ecological point of view this area is regarded as having a high conservation value and ecosystem functioning". Further to that, the layout and sensitivity map dated 11 January 2023 shows that most of the infrastructure for the PV facility including the powerline servitude is placed within the area of medium sensitivity. Please explain why the proposed development site is considered favourable or suitable for the proposed development.	The text quoted from the Ecological Impact Assessment (Appendix E1 of this Final EIA Report) has been taken out of context. The text quoted is related to Vegetation Unit 1, which is relevant only to the Seasonal Drainage Channel. This channel has been avoided by the placement of the development footprint within the larger site as per Figure G3 of this Final EIA Report. The development footprint falls within vegetation units 2, 3 and 4 that are classified as being of a low and low-medium conservation value and ecosystem functioning. Considering the above, it is confirmed that the site is still considered favourable as the preferred layout has avoided the highly sensitive Seasonal Drainage Channel.
The following Specialist Assessments will form part of the EIAr: ➢ Geotechnical Assessment, ➢ Visual Impact Assessment, ➢ Heritage and Palaeontological Impact Assessment, ➢ Ecological Impact Assessment,	The required specialist studies formed part of the draft EIA Report as per the list provided below: • Appendix E1: Ecological Impact Assessment • Appendix E2: Avifaunal Impact Assessment • Appendix E3: Visual Impact Assessment

➢ Social Impact Assessment, ➢ Traffic Impact; and ➢ Soil and Agricultural Statement.	• Appendix E4: Agricultural Compliance Statement • Appendix E5: Heritage Impact Assessment • Appendix E6: Social Impact Assessment • Appendix E7: Traffic Impact Assessment • Appendix E8: Geotechnical Feasibility Assessment (Preliminary Geological Investigation) These studies are also included as part of this Final EIA Report.
The EAP must ensure that the terms of reference for all the identified specialist studies must include the following:	Requirements noted. Responses are provided in the rows below.
A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisation.	Each specialist study includes the methodology followed, as well as the descriptions associated with the proposed developments, including technical details, and the preferred layout maps.
Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed.	Each specialist study includes a description of limitations and gaps associated with the study, where relevant.
Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	The definition of a "no-go" area is noted. The preferred layout map (Figure I) has been designed to avoid all environmental sensitivities and no-go areas to ensure that the layout is appropriate from an environmental perspective. This is also as per the recommendations made by the independent specialists.
Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.	The definition of "no-go" area is the same for the Department and specialists. Only no-go buffers are related to the Seasonal Drainage Channel, which has been avoided by the preferred layout map (refer to Figure I).
All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.	All specialist studies are final. Practical mitigation and management measures and recommendations have been provided by the respective specialists for all impacts identified and assessed Refer to the respective specialist studies included in Appendix E, as well as section 6.2.

Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Practical mitigation and management measures and recommendations have been provided by the respective specialists for all impacts identified and assessed Refer to the respective specialist studies included in Appendix E, as well as section 6.2.
Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	No contradicting recommendations have been provided at this time by the specialists.
It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes (as per the Screening Report), which were promulgated in Government Notice No. 320 of 20 March 2020 and in Government Notice No. 1150 of 30 October 2020 (i.e., "the Protocols"), have come into effect. Please note that specialist assessments must be conducted in accordance with the requirements of these protocols.	The protocols have been adhered to by the relevant specialists, as per the content of the specialist reports included in Appendix E of this Final EIA Report. Also refer to Section 1.5 for an indication of the specialist studies undertaken as per the results of the DFFE Screening Tool Report (Appendix B). The relevant independent specialists have the correct registrations as required by the protocol.
(f) Cumulative Impact Assessment	
Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: The cumulative impact must consider the existing, authorised but not yet developed and the proposed similar development:	Chapter 7 of this Final EIA Report considers existing, authorised and in process similar developments which may contribute to cumulative impacts within the geographic area of evaluation.
Assess the cumulative impacts of the proposed (not yet authorised), authorised (not yet constructed) and existing solar energy facilities.	Cumulative impacts have been defined and the size of impacts quantified as per the impact assessments undertaken as part of the respective independent specialist studies (Appendix E of this Final EIA Report). Proposed and authorised, but not yet constructed developments have been considered as part of the assessment.
Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.	A detailed process flow is included in section 7.5 and Figure 7.2 of this Final EIA Report. It must be noted that not all information on other developments is readily available and therefore only information that could be obtained for the area has been considered as part of the cumulative impact assessment.

The cumulative impacts significance rating must also inform the need and desirability of the proposed development.	Sections 4.2 and 7.7 of this Final EIA Report provides an indication of the need and desirability of the proposed development in terms of the cumulative impact assessment.
A cumulative impact environmental statement on whether the proposed development must proceed.	Section 7.7 of this Final EIA Report provides a cumulative impact environmental statement on whether the development must proceed or not considering the cumulative impact assessment.
(g) Environmental Management Programme (EMPr)	
The EMPr must also include the following:	The requirements are noted and responded to in the rows below.
All recommendations and mitigation measures recorded in the final EIAr and the specialist studies conducted.	Mitigation measures included and recommended in the EIA Report and specialist studies have been included in the EMPrs for the development. Refer to Appendix F.
An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	Figure 2 included in the EMPr for (Appendix F1) provides the environmental sensitivity map, which also indicates the preferred layout.
Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.	Specific measures have been included in the EMPr for spillages or pollutants. Specific mitigation measures have been recommended by the ecological specialist for due to the presence of a seasonal drainage feature within the site under assessment. It must be noted that the channel, and associated buffer, is avoided by the development footprint.
In addition to the above, the EMPr for the facility must comply with Appendix 4 of the EIA Regulations, 2014, as amended.	The EMPr that has been compiled for the solar energy facility is in line with Appendix 4 of the EIA Regulations, 2014, as amended.
Ensure that generic EMPrs for the 33/132kV substation and powerline are compiled and submitted as the proposed development triggers activity 11 of Listing Notice 1 of NEMA EIA Regulations 2014 as amended.	Generic EMPrs have been compiled for the on-site facility substation and power line for the solar energy facility. These Generic EMPrs are included as Appendix F2 and F3 of the draft EIA Report.
Part B: Section 2 of the generic EMPrs must be completed, and a copy of an originally signed EMPrs must be submitted with the final BAR. Please note that	Part B, Section 2 of each respective Generic EMPr have been completed, including the signed declaration by the Applicant. Refer to Appendix F2 and F3 of this Final EIA Report.

Point 7.1.1 in Part B: Section 2 needs to match the details of the applicant as contained in the application form.	
If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and actions must be included in section C of the generic EMPr.	Section C of each respective Generic EMPr has been completed accordingly. Refer to Appendix F2 and F3 of this Final EIA Report.
General	
The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amended, regarding the time allowed for complying with the requirements of the Regulations.	The submission of the final EIA Report is within the prescribed timeframes of the EIA Regulations in order to ensure that the Application for Environmental Authorosation does not lapse.
You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	The Applicant is aware the no activity may commence prior to the environmental authorisation being granted by the competent authority.

2 ACTIVITY DESCRIPTION

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

Appendix 3. (3) An EIR (...) 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 activities entail the development of a photovoltaic solar facility and associated infrastructure on the Remaining Extent of Farm Vogelsrand No. 373, Registration Division Ventersburg, situated within the Mathjhabeng Local Municipality area of jurisdiction. The proposed development is located in the Free State Province in the northern central interior of South-Africa (refer to Figure B for the regional map). The town of Henneman is located approximately 4km southeast of the proposed development (refer to Figure A for the locality map).

The project entails the generation of 20MW electrical power through the installation and operation of photovoltaic (PV) panels. An area of approximately 70ha has been identified within the affected property and assessed as part of the EIA process, and a smaller area for the placement of the infrastructure (including supporting infrastructure on site), known as the development footprint, has been placed within the larger area assessed. The development footprint is proposed to be 53ha in extent. Refer to Table 2.1 for general site information.

The area is deemed as technically feasible for the development of the solar photovoltaic project. The Applicant has designed an environmentally appropriate facility layout for the development within the site through an optimisation process which aims to comply with all the recommendations of the

independent specialists in terms of the placement of the respective development footprints (including all associated infrastructure). The proposed and optimised development footprint is assessed as part of this Final EIA Report and included in Figure I.

The property on which the facility is to be constructed will be leased by DPT Henneman (Pty) Ltd from the property owner, Bennie de Klerk, for the life span of the project (minimum of 35 years).

The proposed project is intended to either form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or the electricity generated by the facility will be wheeled into the national grid for offtake by third parties as part of other generation opportunities. It is expected that generation from the facility will tie in with the existing Kroonstad-Everest 132kV Power Line via a loop-in loop-out connection through the development of a new 132kV power line. The connection point is located within the site on the affected property.

Refer to Table 2.1 for general site information associated with the development.

Table 2.1: General site information

Description of affected farm portion	Solar Power Plant Remaining Extent of the Farm Vogelsrand No. 373 Power Line Remaining Extent of the Farm Vogelsrand No. 373
Province	Free State
District Municipality	Lejweleputswa District Municipality
Local Municipality	Matjhabeng Local Municipality
Ward numbers	3
Closest towns	The town of Henneman is located approximately 4km southeast of the proposed development.
21 Digit Surveyor General codes	Solar Power Plant Remaining Extent of the Farm Vogelsrand No. 373: F03500000000373000001 Power Line Remaining Extent of the Farm Vogelsrand No. 373: F03500000000373000001
Type of technology	Photovoltaic solar facility
Structure Height	Panels ~2m, buildings ~ 6m, power line ~18m and Battery Storage Facility ~4m height
Battery storage	Within a 4-hectare area

Surface area to be covered (Development footprint)	Approximately 53 ha
Area assessed as part of the EIA process	Approximately 70 ha
Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is in order to capture the most sun.
Generation capacity	20MW

The site/affected property is located in a rural area and is bordered by agricultural land uses, as well as mining activities that are present within the general area. The site survey revealed that the affected property currently consists of agricultural activities, primarily grazing – refer to plates 1-12 for photographs of the affected property and proposed development footprint area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 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, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is –* *a) temporarily required to allow for maintenance of existing infrastructure;* *b) 2 kilometres or shorter in length;* *c) within an existing transmission line servitude; and* *d) will be removed within 18 months of the commencement of development.."* • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132kV), an

		on-site HV/MV substation and switching station (132kV). It is expected that generation from the facility will tie in with the existing Kroonstad-Everest 132kV Power Line via a loop-in loop-out connection. The connection point is located within the site on the affected property.
GNR. 327 (as amended in 2017)	Activity 12(ii)(c)	• *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse, excluding –* *(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applied;* *(cc) activities listed in activity 14 in Listing Notice 2 od 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such development occurs within an urban area;* *(ee) where such development occurs within existing roads, road reserves or railway line reserves; or* *(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared."* • Activity 12(ii)(c) is triggered based on the presence of a seasonal drainage channel located within the south of the site. The layout of the facility is located within 32m from the edge of the watercourse. The infrastructure that is located within 32m from the edge of the watercourse includes the facility fence, access roads and PV panels which forms part of the entire development footprint/facility layout. The development footprint of the solar power plant will be 53 ha / 530000 square meters in extent and therefore the infrastructure to be developed within 32m is more than 100 square meters.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*

		• Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres. Diesel and oil are required during the construction and operation phases for the undertaking of the required construction and operation phase activities, including that of the operation of equipment and machinery.
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, excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes."* • Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 53 ha in extent.
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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate 20 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, excluding where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan."* • In terms of vegetation type the site falls within the Vaal-Vet Sandy Grassland which is described by Mucina and Rutherford (2006) as Endangered. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20

		hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 53 ha in extent. A total of 530000 square meters will be cleared.
GNR. 324 (as amended in 2017)	Activity 10 (b)(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 (b) in the Free State, (i) outside urban areas, ,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 10(b)(i)(ee)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a capacity exceeding 30 but not exceeding 80 cubic metres. The project is located within the Free State Province and a section of the site is located within a CBA 1 area, as per the Free State Biodiversity Conservation Plan (2015). Furthermore, a seasonal drainage channel is located within the south of the site. Diesel and oil is required during the construction and operation phases for the undertaking of the required construction and operation phase activities, including that of the operation of equipment and machinery.
GNR. 324 (as amended in 2017)	Activity 12 (b)(i)(ii)(vi)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation, except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan, (b) in the Free State, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 12 (b)(i)(ii)(vi) is triggered since the proposed development is located in the Free State province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. In terms of vegetation type the site

		falls within the Vaal-Vet Sandy Grassland which is described by Mucina and Rutherford (2006) as Endangered. A section of the site is located within a CBA 1 area, as per the Free State Biodiversity Conservation Plan (2015). Furthermore, a seasonal drainage channel is located within the south of the site. The development footprint of the solar power plant will be 53 ha in extent. A total of 530000 square meters will be cleared.
GNR. 324 (as amended in 2017)	Activity 14(ii)(c)(b)(i)(ff)	• "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour, (b) within the Free State, (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)(c)(b)(i)(ff) is triggered based on the presence of a seasonal drainage channel located within the south of the site. A section of the site is located within a CBA 1 area, as per the Free State Biodiversity Conservation Plan (2015). The layout of the facility is located within 32m from the edge of the watercourse. The development footprint of the solar power plant will be 53 ha / 530000 square meters in extent.

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

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

- Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
- Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
- Construction of access and inside roads/paths – existing paths will be used where reasonably possible. Access will be obtained via the R70 located to the north of the site. Additionally, the turning circle for trucks will also be taken into consideration.

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

2.3 PHOTOVOLTAIC TECHNOLOGY

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

The key components of the proposed project are described below.

- PV Panel Array - To produce 20MW, the proposed facilities 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 mounted to a single access tracking frame system.
- 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 800V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required (22/132kV). Output voltage from the inverter is 800V 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 132kV power line. It is expected that generation from the facility will connect to the national grid via a loop-in loop-out connection into the existing Kroonstad-Everest 132kV Power Line. The proposed connection point into the national grid is located within the Remaining Extent of Farm Vogelsrand No. 373.
- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~0.5m-1m underground as far as practically possible.
- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:
    - Office / Control Room (~300m²);
    - 22kV Switch gear and relay room (~200m²);
    - 22kV/132KV Outdoor Switchyard (5000m²);
    - Security control (~60m²)
- Battery Energy Storage System – A Battery Storage Facility with BESS Containerized solution and associated operational, safety and control infrastructure will be required. A maximum

height of 4m and a maximum volume of 6400m^3 of batteries and associated operational, safety and control infrastructure is expected to be required.

- Roads – Access will be obtained via the R70 regional road to the north of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Internal roads are expected to have a width of up to 4m.
- 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 up to 2.5 meters will be used (will be of a Clearvu type fence).

2.4 LAYOUT DESCRIPTION

The layout plan / development footprint for the facility considers and adheres to the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site – refer to Figure G3 and Figure I. The total surface area proposed for the layout of the facility includes the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power line, battery energy storage system, on-site substation and switching station and perimeter fences). Limited features of environmental significance exist on site, however the sensitivities that do exist have been avoided through the careful placement of the development footprint of the solar facility. Table 2.3 provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

Table 2.3: Technical details for the proposed solar facility

Component	Description / dimensions
Height of PV panels	2.2 meters
Area of PV Array	53 Hectares (Development footprint)
Number of inverters required	Minimum 59
Area occupied by inverter / transformer stations / substations / BESS	22kV Switch gear and relay room: ~200m² 22kV/132KV Outdoor Switchyard: 5000m^2; BESS: 2 000 m^2 22kV/132kV Facility Substation: 100m^2
Capacity of on-site substation	24MVA ONAN; 22/132KV
Capacity of the power line	132kV
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 53 Hectares Construction Laydown Area: ~2000 m^2
Area occupied by buildings	Office / Control Room : ~300m² 22kV Switch gear and relay room: ~200m² 22kV/132KV Outdoor Switchyard: 5000m^2; Security control: ~60m²
Battery storage facility	Maximum height: 4m Maximum volume: 40m x 40m x 4m /6400m^3
Length of internal roads	To be determined
Width of internal roads	Up to 4m
Proximity to grid connection	Approximately 25 metres

Grid connection corridor length	50m
Power Line Lenght	25m
Power servitude width	32m
Height of fencing	Approximately 2.5 meters

Table 2.4 provides the coordinate points for the proposed project site and associated infrastructure for the proposed 20MW Solar Facility. This is in line with the final facility layout proposed for the development.

It must however be noted that locations may change slightly as a result of changes in the landscape that may occur during the time period between initial planning and actual implementation of the facility layouts.

Table 2.4: Coordinates of Solar Facility Development Footprint

Coordinates			
Development footprint	A	27°57'34.62"S	26°58'3.44"E
	B	27°57'28.21"S	26°58'13.15"E
	C	27°57'53.31"S	26°58'31.86"E
	D	27°58'11.81"S	26°58'43.53"E
	E	27°58'24.02"S	26°58'39.94"E
	F	27°58'3.25"S	26°58'24.24"E
Battery Energy Storage System (BESS)	A	27° 57' 54.87" S	26° 58' 31.35" E
	B	27° 57' 55.42" S	26° 58' 32.26" E
	C	27° 57' 56.23" S	26° 58' 31.64" E
	D	27° 57' 55.68" S	26° 58' 30.73" E
On-site facility substation corner coordinates	A	27° 57' 55.83" S	26° 58' 32.71" E
	B	27° 57' 56.07" S	26° 58' 33.09" E
	C	27° 57' 56.29" S	26° 58' 32.91" E
	D	27° 57' 56.54" S	26° 58' 33.29" E
	E	27° 57' 56.85" S	26° 58' 33.03" E
	F	27° 57' 56.37" S	26° 58' 32.27" E
Power Line Corridor corner coordinates	A	27° 57' 55.46" S	26° 58' 33.31" E
	B	27° 57' 56.85" S	26° 58' 32.08" E
	C	27° 57' 56.46" S	26° 58' 31.60" E
	D	27° 57' 55.07" S	26° 58' 32.83" E

2.5 SERVICES PROVISION

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

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources or alternatively collected with water trucks from an authorized water service provider and stored on site. The Department of Water and Sanitation will be contacted by the project proponent 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 be undertaken following receipt of the Environmental Authorisation.

During construction 140 000 litres / 140m^3 of water will be required for civil works, which is expected to be for a 35 day period, after which 45 000 litres / 45m^3 of water will be require for the remainder of the construction phase, which will also be for the undertaking of dust suppression.

During the operation phase 70 000 litres / 70m^3 will be required each month for the operation and maintenance of the facility. Washing of the PV panels will be required, it is expected that 5040 litres / 5.04m^3 of water will be required per annum to undertake the washing.

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

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

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. It will also be good practice to design stormwater canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Stormwater management and mitigation measures are included in the Environmental Management Programmes (EMPr) – refer to Appendix F1.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Waste will be disposed of at a licensed landfill site. The construction- and hazardous waste will be removed and disposed of at licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality. No municipal sanitation services will be required as an on site sewage system will be installed and waste removal will be undertaken by a contracted company.

2.5.4 Electricity

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

2.5.5 Decommissioning of the facilities

The operating period will be 35 years from the commencement date of the operation phase. Thereafter rights of renewal periods 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.

<u>The decommissioning process will consist of the following steps:</u>

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

- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

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

- Removal of all structures and rubble,
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil,
- The surface will be restored to the original contours and hydro seeding will take place.

3 LEGISLATIVE AND POLICY CONTEXT

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

Appendix 3. (3) An EIR (...) 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 is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries, and the Environment (DFFE) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in the IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed developments 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)
- Electricity Regulation Act (Act No. 4 of 2006) (as amended)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA)
- 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)
- Subdivision of Agricultural Land Act (70 of 1970) (SALA)
- Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA)
- The National Forests Act, 1998 (Act 84 of 1998)
- The National Road Traffic Act (93 of 1996) (NRTA)
- Disaster Management Act, 2002. Regulations issues in terms of section 27(2) of 27 February 2023.

- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Free State Provincial Spatial Development Framework (PSDF) (2012)
- Lejweleputswa District Municipality Final Integrated Development Plan (IDP) 2021 – 2022
- Matjhabeng Local Municipality Integrated Development Plan 2022/2023
- Matjhabeng Municipal Spatial Development Framework Phase 4 (SDF) (2020/2021 – 2024/2025)

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

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 solar energy facility 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	National Department of Environmental Affairs (now known as the Department of	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

Management Act **(Act No. 107 of 1998)**	Forestry, Fisheries and the Environment) and the Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		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. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. The EIA process undertaken for the proposed solar energy facility 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 solar energy facility 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.

Electricity Regulation Act (Act No. 4 of 2006) (as amended)	National Energy Regulator of South Africa (NERSA)	2006	The Act provides a national regulatory framework for the electricity supply industry. The Act requires registration and licensing of anyone wanting to generate, transmit, reticulate, distribute, trade, or import and export electricity. One of the requirements for the REIPPPP is for the Proponent to hold an environmental authorisation for the proposed project. The REIPPPP is guided by the National Energy Act, one of the purposes of which is to promote sustainable development of renewable energy infrastructure.
The National Water Act (Act No. 36 of 1998)	Department of Water Affairs (now known as Department of Water and Sanitation)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The site is located within the C42J quaternary catchment and is situated in the Middle Vaal Water Management Area. A Seasonal Drainage Channel is present within the site assessed, but is not located within the proposed development footprint. Refer to the Ecological Impact Assessment included as Appendix E1.

			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: Biodiversity Act (10 of 2004) (NEMBA)	Department of Forestry, Fisheries and the Environment (DFFE)	2004	"The Act calls for the management of all biodiversity within South Africa. The 2007 Threatened or Protected Species Regulations (GN R150, as amended) provides protection through a permit system as well as through the identification of restricted activities. If required, the relevant permits will be applied for." The Act also provides for duty of care with regards to control of alien species.
National Environmental Management: Waste Act **(Act No. 59 of 2008)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered.
National Environment	National Department Environmental Affairs (DEA)	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

Management: Air Quality Act **(Act No. 39 of 2004)**	(Now known as the Department of Forestry, Fisheries and the Environment)		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 proposed solar energy facility and all relevant documents have been submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix E5, which covers both the archaeological and palaeontological components.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long term lease agreement. A Soils and Agricultural Compliance statement has been undertaken for the proposed solar energy facility and is included as Appendix E4.
Subdivision of Agricultural Land Act (70 of 1970) (SALA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	1970	The purpose of this Act is to control the subdivision of agricultural land and, in connection therewith, the use of agricultural land. Applications are lodged with Department of Agriculture, Land Reform and Rural Development (DALRRD) to allow for the subdivision of agricultural land, as well as other prohibited actions in terms of the Act. In order to limit the potential threat that solar energy development could pose to agricultural production and to the agricultural economy, DALRRD created the 10% rule to inform the decision of whether a solar energy development on agricultural land should be approved or not. This rule states that a solar energy facility may not utilise

			more than 10% of the surface area of a farm. Its aim was to ensure that each farm unit remained predominantly agricultural rather than certain farms abandoning agricultural production in favour of renewable energy generation.
Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA);	Provincial Authority	2013	This suite of legislation provides the framework for spatial planning and regulates the use and development of land.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove,

			transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. An Ecological Impact Assessment has been undertaken for the solar energy facility and is included in Appendix E1.
National Road Traffic Act (93 of 1996) (NRTA)	Department Roads and Public Works	1996	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. Due to the large size of some of the facility's component, they will need to be transported via "abnormal loads". The site is directly adjacent to the R70 therefore providing easy access from a regional and national roads. The readily access of the site ensures that the heavy vehicles can reach the site.

3.3 POLICY CONTEXT

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

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

			Disadvantages include: • Higher capital costs in some cases; • Lower energy densities; and • Lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. The proposed solar energy facility 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 proposed solar energy facility is in line with this paper as it proposes the generation of renewable energy from the solar resource.

Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a "living plan" which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030. "*This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation".* In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options (RSA, 2011a). The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that: "*The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry*; *To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP; The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS*" (RSA, 2011a:6). *"The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources"* (RSA, 2011a:6). The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is: "*Solar PV programme 2012-2015: In order to facilitate the*

connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment."

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

In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP was updated and was open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. For the revision scenario, analysis was conducted. The results revealed that for the period ending 2030 that: *"The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025"; "Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030*"; and *"the scenario without renewable energy annual build limits provides the least-cost option by 2030*" (RSA, 2018:34).

Lastly, the 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 account together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *"The application of renewable build limits 'smoothes out' the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence*". The decision stated against this key consideration is to *"retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan"* (RSA, 2019:46). Hereby the IRP also recognises renewable technologies' potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13). The proposed solar energy facility is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.
National Development Plan of 2030	The Presidency: - National Planning Commission	The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a 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 proposed solar energy facility will contribute to the intervention strategy as identified within the plan.

National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretch over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow: - SIP 8: Green energy in support of the South African economy; - SIP 9: Electricity generation to support socio-economic development; and - SIP 10: Electricity transmission and distribution for all. SIP 8 according to the Plan "*support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities*". The purpose of SIP 9 according to the Plan is to "*accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances*". SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" (RSA, 2012:20).

		The development of the proposed solar energy facility is in line with this plan as it proposes the generation of renewable energy from the solar resource which supports socio-economic development and will contribute to meeting the electricity demand of the country as set out in this plan.
New Growth Path Framework	Department of - Economic Development	The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b). This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy in the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to: - Identify the possible areas of employment creation; and - Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b). This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term. Considering that the construction of and investment in renewable energy is a key area identified within the framework, the development of the proposed solar energy facility is considered to be in-line with the framework.

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

			It recognises that South Africa has a global responsibility to reduce greenhouse gasses and that the anticipated impacts arising as a result of climate change have the potential to undermine achieving of the country's developmental goals. The main objective of the bill is to enable the development of an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society, and to provide for matters connected therewith. The proposed development comprises the development of a renewable energy generation facility and would therefore not result in the generation or release of emissions during its operation.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee	2010 - 2030	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility: • SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. • SIP 9: Electricity generation to support socio-economic development: The proposed solar energy facility potential SIP 9 Projects as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become SIP 9 projects if selected as Preferred Bidder projects by the Department of Mineral Resources and Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity

			in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. The proposed solar energy facility could be registered as a SIP project once selected as preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs.
Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2014	The then Department of 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 were accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit.

			The proposed solar energy facility is not located within a REDZ, but the development will contribute to the expansion of renewable energy facilities and infrastructure within the country, and enable the positive opportunities associated with it.
Free State Provincial Spatial Development Framework (PSDF)	Free State Provincial Government	2012	The Free State PSDF is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the Free State Provincial Growth and Development Strategy which has committed the Free State to 'building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development'. The PSDF includes comprehensive plans and strategies that collectively indicate which type of land-use should be promoted in the Province, where such land-use should take place, and how it should be implemented and managed. In broad terms, the PSDF: • Indicates the spatial implications of the core development objectives of the Free State Provincial Growth and Development Strategy. • Serves as a spatial plan that facilitates local economic development. • Lays down strategies, proposals and guidelines as it relates to sustainable development. • Facilitates cross-boundary co-operation between municipalities, adjoining provinces, and bordering countries. • Serves as a manual for integration and standardisation of the planning frameworks of all spheres of government in the Province. The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed is. The PSDF gives practical effect to sustainable development, which is defined

			as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local. The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges of our time, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology. The development of the solar energy facility is in-line with the framework based on the contributions and opportunities presented by development of this nature.
Lejweleputswa District Municipality Integrated Development Plan (IDP)	Lejweleputswa District Municipality	2021-2022	The long-term vision of the Lejweleputswa DM is to be: "A leader in sustainable development and service delivery to all". The above stated vision defines what Lejweleputswa District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is: "Providing sound financial management. Providing excellent, vibrant public participation and high quality local municipal support programmes by maintaining good working relations in the spirit of co-operative governance, and enhancing high staff morale, productivity and motivation". The IDP identified specific objectives, strategies and projects for the district as per the District Rural Development Plan and the District Rural Development Implementation Plan. Key Performance Area 3 relates to Local Economic Development and lists that the development of a solar plant as one of the Municipal Focus Areas with the objective to revive the regional economy of the District Municipality with the intention of creating sustainable economies.

			The development of the proposed solar energy facility is in line with the plan, considering the relevant Key Performance Area stated in the IDP.
Matjhabeng Local Municipality Integrated Development Plan (IDP)	Matjhabeng Local Municipality	2022/ 2023	The long-term strategic focus is to be a "benchmark developmental municipality in service delivery excellence" which can be attained through: • Effective use of scarce resources • Attraction of additional funds • Improved and speedy service delivery • Strengthening of democracy through public participation • Promotion of coordinated planning between the Local, Provincial and National Government • Planning that works to dismantle the legacy of the past era of apartheid The IDP consider the economy structure and performance of the area and indicates that there is a high dependency on the mining sector which is declining. Therefore, alternatives to the declining sector has to be explored such as gas and renewable energy. The development of the proposed solar energy facility will contribute to the goals of the area, albeit to a limited extent.
Matjhabeng Municipal Spatial Development Framework (SDF)	Matjhabeng Local Municipality	2020/ 2021-2024/ 2025	The SDF provides broad land use management guidelines for the municipal area. Specific development objectives are identified which related to the development of renewable energy facilities. These include integrated and broad-based agrarian transformation leading to sustainable livelihoods, increased rural economic development and improved land reform., and efficient, integrated spatial development of infrastructure and transport systems in shared focus areas. Both of these objectives refer to the development of renewable energy facilities, and in particular makes mention of solar power plants.

	The development of the proposed solar energy facility will contribute to the objective of the area, albeit to a limited extent.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

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

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Development Bank of Southern Africa (DBSA): Environmental and Social Safeguard Standards
- 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
- DEA, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

3.6 CONCLUSION

The EIA was undertaken in accordance with the EIA Regulations (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 and national guidelines.

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

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

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed 20MW solar energy facility is therefore supported by the related policy and planning documents reviewed in this section of the report. The support for the development of solar energy facilities from all spheres of Government also indicates the significant need and desirability of the development of such facilities within the country, especially considering the current energy crisis being experienced in the country.

4 THE NEED AND DESIRABILITY

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

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

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

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or or the electricity generated by the facility will be wheeled into the national grid for offtake by third parties as part of other generation 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 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. Even though the project might also be for private use by the third party offtakers (if not successful in the REIPPP Programme) the proposed development will still contribute to close the shortfall of electricity supply to these offtakers, albeit to a limited extent.

Furthermore, on the 09 February 2023, South African President Cyril Ramaphosa declared a national state of disaster over the countries crippling power shortages. On the 27 February 2023 new regulations were gazetted to address the energy crisis (No. 11547, Vol. 692) in this regard. There is currently therefore a strong need for new generation capacity to come online which may assist in the combating of the current crisis being experienced. It must however be noted that the South African Government terminated National State of Disaster on electricity supply constraints on 09 February 2023.

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the 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. In December of 2022, five solar energy preferred bidders were announced by the Department of Mineral Resources and Energy under Bid Window 6, with a total capacity amounting to 860MW. Bid window 7 is expected mid 2023.

The need for the development of the 20MW solar energy facility is therefore relevant from a local to national level, and considering the current state of electricity supply in the country, the need for the development of a facility of this nature is quite significant.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The contribution of the facility 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. The lesser dependence will be specific to either the national grid (REIPPP programme) or the third party offtakers (wheeling agreement).
- Increased surety of supply - By diversifying the sources of power for the country as a whole or for third party offtakers, the surety of supply will increase for their respective operations and needs. 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 and operation for electricity users. 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 Free State 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 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. Should the electricity be utilised by third party offtakers the proposed solar energy facility will reduce the cost of the power to be used by the third party offtakers. This will also contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.

- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in non-renewable electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Reduced dispersion of environmental impacts – As all infrastructure associated with the solar energy facility is located within the same affected property another an opportunity is created to reduce the dispersion of environmental impacts associated with the development of solar energy facilities in the general landscape. The impacts will take place within a consolidated/confined area which will create opportunities for the mitigation and management of the impacts within a single area.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the power plants. 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 (where possible and available) for the duration of the construction period. The operation phase will provide permanent job opportunities to the local communities from the surrounding area (where possible) since security guards and general labourers will be required on a full-time basis. Approximately 110 employment opportunities will be created during the construction and operation 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, especially during the construction phase.
- Effective use of resources - In the relatively low rainfall of the site (494 mm per annum), soils without sufficient depth (more than 800 mm) have too little moisture reservoir to support viable cropping. The site is used only for grazing. The long-term grazing capacity of the site is 7 hectares per large stock unit. The proposed development in this specific area will generate alternative land use income through rental for the proposed energy facility, which will have a positive impact on the agriculture of the affected property. It will provide the farming

enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.

- Increased access to electricity: According to the Matjhabeng LM IDP, the national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment. The proposed solar energy facility will increase access and supply of electricity users.
- 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, it is preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental and agricultural value elsewhere in the country. Furthermore, as the proposed development, including all associated infrastructure, is located within one affected property it creates an opportunity to concentrate the cumulative transformation and disturbance of the landscape within one area and also provides for the easy mitigation of negative impacts as these are expected to occur within close proximity to one another.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

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

(g) A motivation for the preferred development footprint within the approved site (i) details of all the alternatives considered;

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

(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

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

An initial site assessment was conducted by the developer on Remaining Extent of the Farm Vogelsrand No. 373 and the farm was found favorable due to its close proximity to grid connections, solar radiation, ecology and relative flat terrain. Some parts of the farm have been deemed not suitable for the proposed development such as areas under cultivation and areas which have been considered by the applicant as being sensitive from an environmental perspective and has therefore been avoided by the placement of the development footprint. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site within the affected property. A single alternative site on the same farm has been identified which is under assessment with an extent of approximately 70ha. The proposed development footprint of 53ha is therefore under assessment and consideration within the broader site to ensure that the development will be appropriate from an environmental perspective.

The site under assessment for the development is also the area that the landowner deems suitable considering the existing agricultural activities being undertaken at the property.

A single alternative site on the affected property has been identified for assessment. The site assessed is 70 ha. Specific features of environmental sensitivity have been identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers have been considered by the developer to ensure that the facility layout of the solar energy facility is appropriate.

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

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo of the affected environment. 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 the current land uses and activities present.

The area associated with the development has relatively low rainfall (494 mm per annum) and soils without sufficient depth (more than 800 mm) that have too little moisture reservoir to support viable cropping. 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 proposed activity. No other properties have at this stage been secured by DPT Hennenman (Pty) Ltd in the Hennenman area to potentially establish the proposed solar energy facility. From a local perspective the Remaining Extent of the Farm Vogelsrand No. 373 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential and archaeology), proximity to a grid connection point located within the affected property (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).

Within the affected property, areas have been excluded from the area under assessment (i.e. 70ha) based on the requirements of the landowner for the current land use activities and areas considered as being sensitive by the developer from an environmental perspective. These areas are not deemed suitable for the project and is not being considered for development at all.

No alternative areas on the Remaining Extent of the Farm Vogelsrand No. 373 have been considered for the development, as the area identified and assessed in the Scoping Phase is considered available and suitable for development from a technical and land use perspective without excluding the current agricultural land use activities from the property.

However, the results of the specialist studies have been considered by the Applicant to exclude the sensitive areas present from the development footprint, which includes no-go buffer areas recommended by the specialists, where relevant. The sensitive areas and associated buffers will be considered by the developer for the facility layout design to optimise the layout for avoidance of the environmental sensitivities identified.

As part of the specialist studies undertaken, areas that will need to be avoided has been identified which includes a seasonal drainage channel present within the area under assessment (70ha). The area under assessment is however large enough to enable the avoidance of the sensitive features and the associated buffers by the facility layout (i.e. development footprint) and still provide an opportunity for the successful development and operation of the proposed solar energy facility from a technical perspective. Refer to Figure G3 and Figure I

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

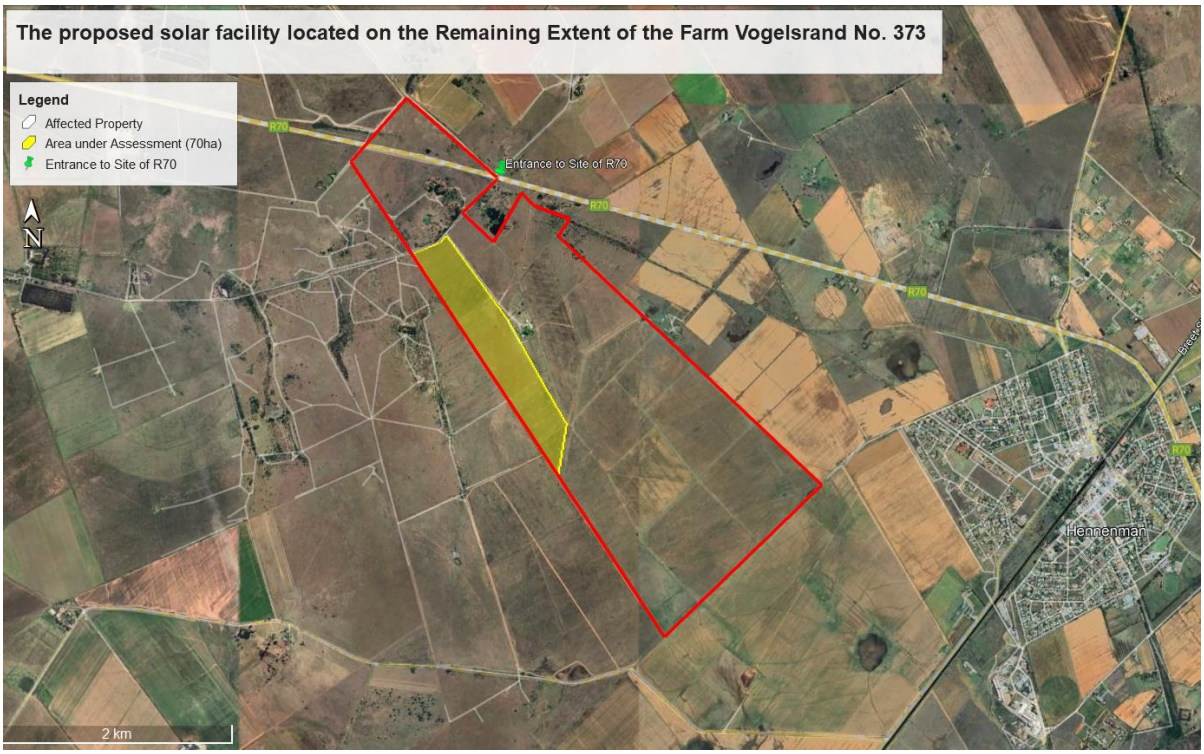


Figure 5.1: Location of the single preferred location alternative located within the affected property assessed, within which the development footprint/facility layout will be placed

Following the Scoping Phase, the Applicant has placed and designed the development footprint / facility layout within the area assessed which avoids the sensitive environmental features and areas that are not considered to be appropriate for development, as identified during the Scoping Phase by the independent specialists. The development footprint proposed and assessed as part of this EIA phase, and within this EIA Report, has an extent of 53ha to enable the generation of 20MW by the solar energy facility. Refer to Figures 5.2 for the environmental sensitivity map produced during the Scoping Phase.

As part of the specialist studies undertaken, areas that will need to be avoided have been identified which mainly relate to a seasonal drainage channel. The site assessed for the project is however large enough to enable the avoidance of the sensitive features and the associated buffers by the layouts of the facility / development footprint and still provide an opportunity for the successful development and operation of the 20MW solar energy facility from a technical perspective.

Considering the above, the placement of the proposed development footprint assessed within the larger site therefore provides an opportunity for sufficient avoidance of the sensitive environmental features as well as sufficient space for the technical optimization of the facilities. Refer to Figure 5.4. which illustrates the avoidance of the high sensitivity area through the careful placement of the development footprint.

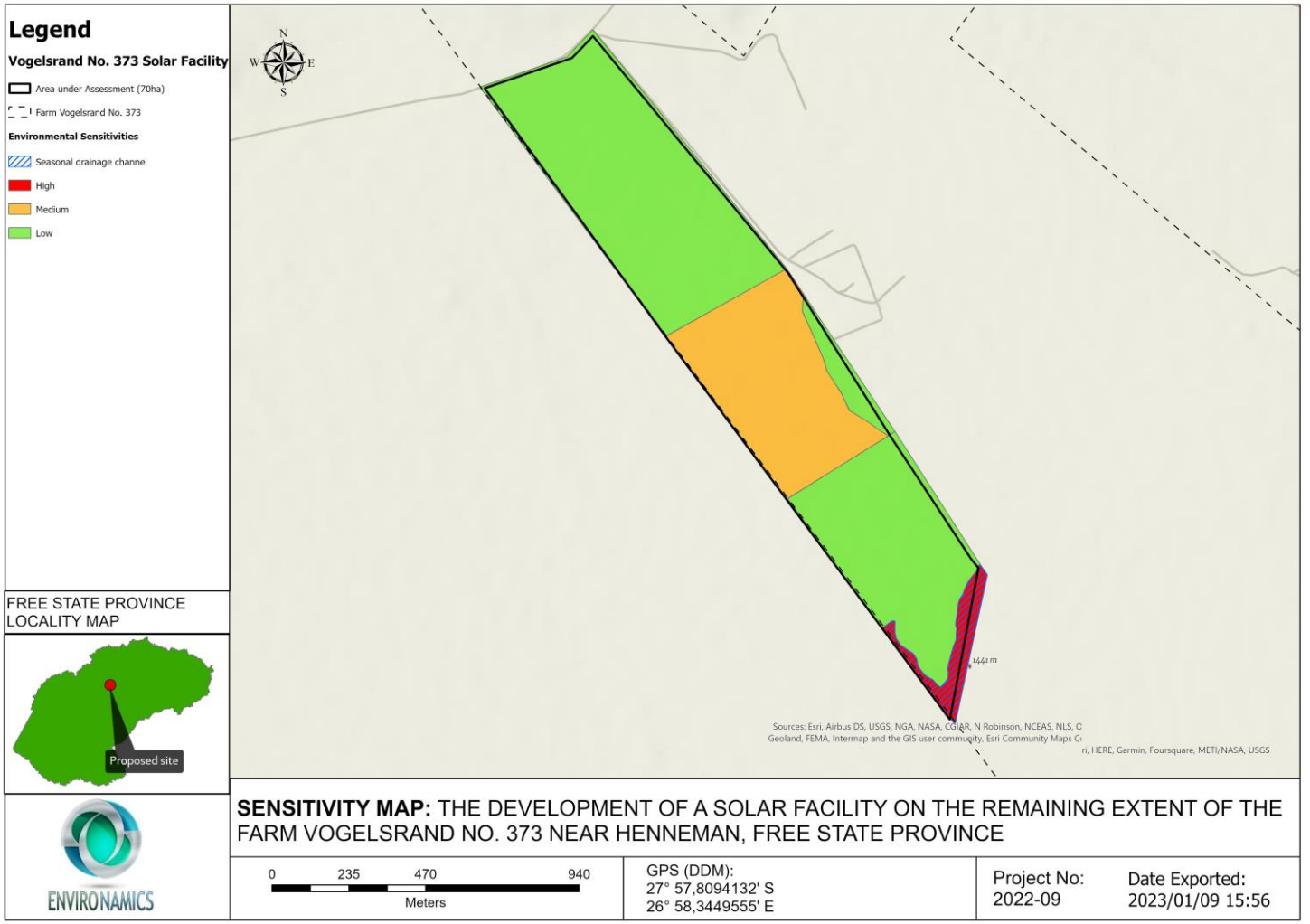


Figure 5.2: Scoping Phase Environmental Sensitivity Map

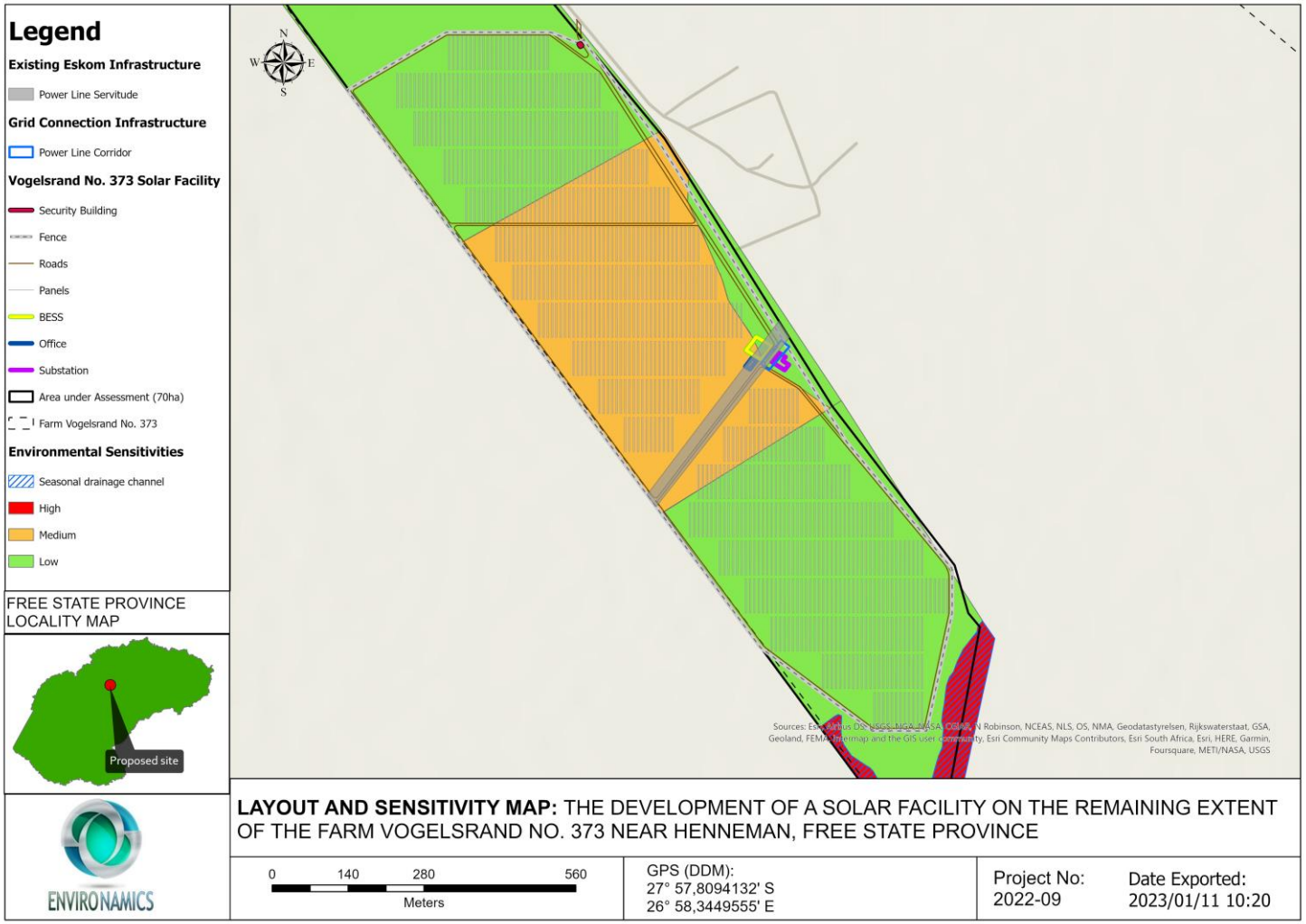


Figure 5.3: Layout and Sensitivity Map

5.1.3 Activity alternatives

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

- Photovoltaic (PV) solar facility – DPT Hennenman (Pty) Ltd considers the development of a PV facility as the most technically feasible option for the site based on the technical requirements and the solar resource available for the area. Therefore, this is considered as the preferred activity alternative for the affected property. Refer to Figure 5.4.
- Wind energy facility - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines based on the renewable energy resource available for the area. This alternative is therefore not regarded as feasible and will not be evaluated further in this report.
- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water, and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also the local area. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP as part of the energy mix of the county. Therefore, this alternative will not be considered further in this report.

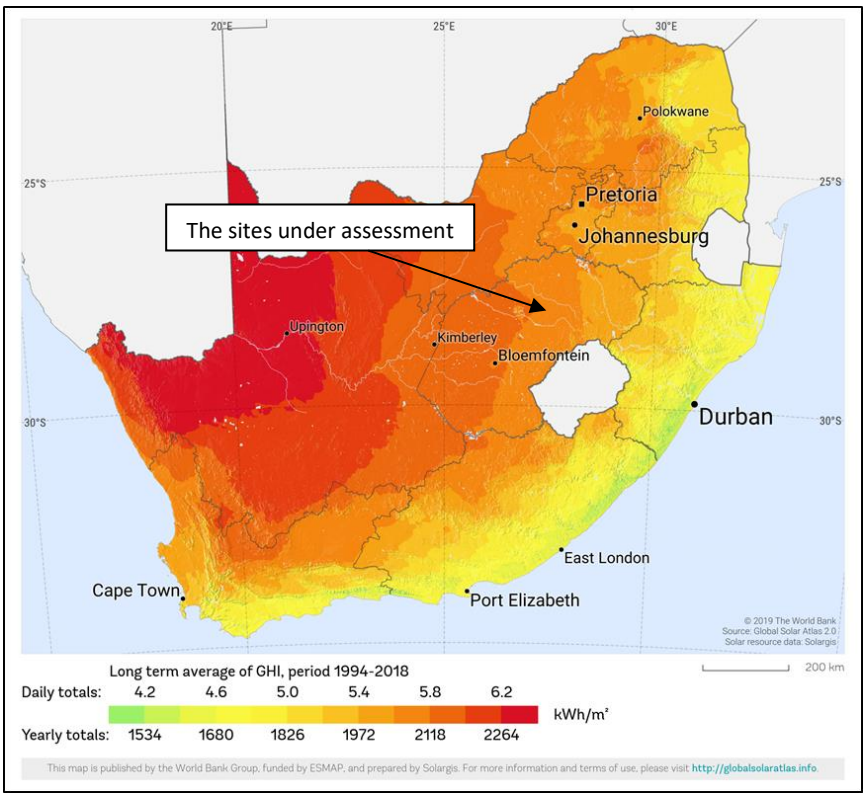


Figure 5.4: Global horizontal irradiation values for South Africa (SolarGIS, 2021) and the area undere assessment for the proposed solar energy facility

5.1.4 Technical alternatives

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

5.1.4.1 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 4m and a maximum volume of approximately 6400m^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 Iron Phosphate (LiFePO4) battery energy storage.

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

5.1.5 Overhead Distribution Power Line

It is expected that generation from the facility will tie in with an existing power line present within the affected property and area under assessment. The preferred grid connection point for the development is the existing Kroonstad-Everest 132kV Power Line. A new 132kV power line will be constructed to connect the solar power plant to the connection point. Refer to Figure 5.5.

A grid connection corridor of 50m long is being assessed for the placement of the power line.

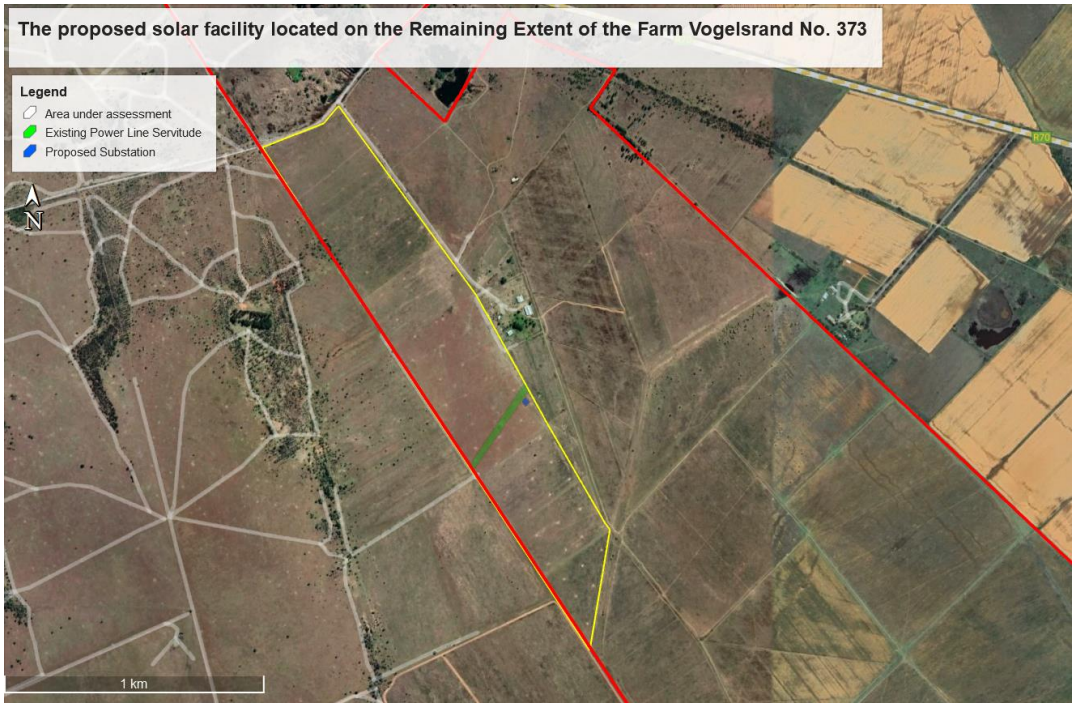


Figure 5.5: Grid connection considered and assessed for the development of the proposed solar energy facility.

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

- **Overhead Distribution Lines** - Overhead lines are less costly to construct than underground lines. Therefore, the preference for overhead lines is mainly based on cost. Overhead lines allow high voltage operations, and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler *et al.*, 2006).

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

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

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

constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

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

- Single Circuit Overhead Power Line

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

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

- Double Circuit Overhead Power Line

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

  The double-circuit overhead power line proves more feasible as the entire plant would not have to be offline as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.

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

At this time no pylons are expected to be required for the development as the power line is proposed to be less than 50m in length.

Should the construction of pylons be required, the choice of pylon structure to be used for the power line will be determined in consultation with Eskom and does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, ecological and heritage impacts of erecting a power line and the line length is only expected to be less than 50m. No defined structure has been confirmed at this stage and will depend on Eskom's technical requirements. The 132kV line must be constructed according to the authorised standards for a power

line approved by Eskom Holdings SoC Ltd. The structure to be utilised for the power line towers will also be informed by the local geotechnical and topographical conditions. The following alternatives are considered with regards to the proposed structures:

Steel lattice towers:

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

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

Steel monopoles:

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

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

Wood poles:

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

5.1.6 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer, which also included the consideration of sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. The final layout plan/development footprint proposed for development is included as Figure I.

The layout follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, fencing and servitudes are considered. The developer has considered the environmental sensitivities as identified during the Scoping Phase and has accordingly optimised the layout of the facility to ensure avoidance of the sensitive areas (Figure G3). This optimised layout is therefore considered to be appropriate for development within the site and is considered to be the final layout plan as assessed within this Final EIA Report.

The total surface area proposed for the facility (up to 53 hectares) includes the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, facility substation, BESS, power line and perimeter fences).

With regards to the PV structures, tracking PV with mono- or bi-facial panels are being considered. Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE). The preference for single axis tracking is also based on the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel mounting types.

The development of the PV facility will take into consideration, as part of the final design phase, the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed- tilt mounting structures. Both options are considered feasible for the 20MW solar energy facillity.

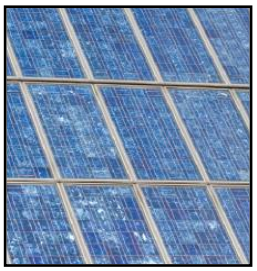
5.1.7 Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, 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.



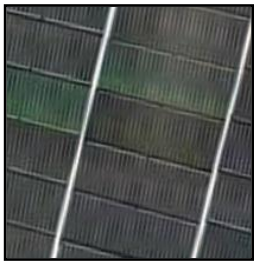
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than 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 the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel. Refer to Figure 5.6.

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

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

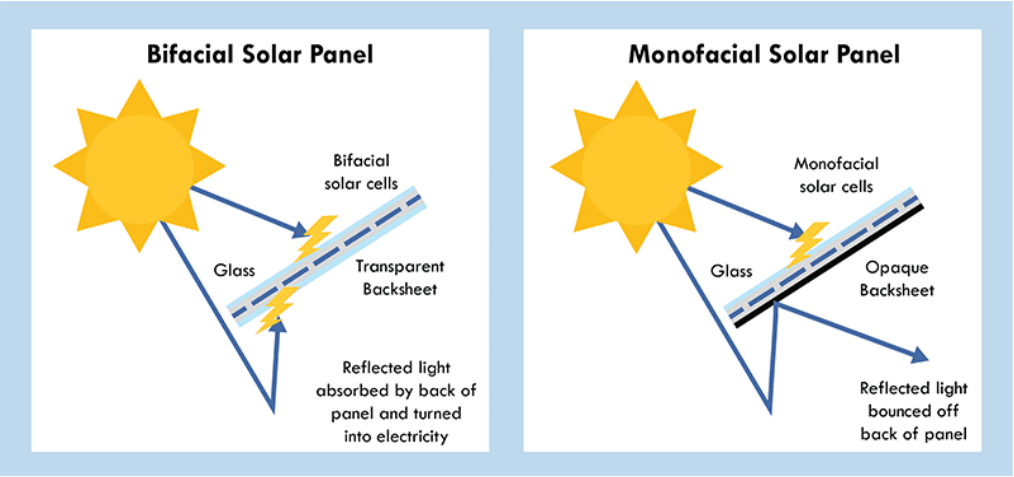


Figure 5.6: Bifacial vs Monofacial Solar Panel absorption

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 for the 20MW solar energy facility was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

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

Since the scale of anticipated impacts is low, the general land use of the area is related to mining and agriculture, the limited environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms are considered at this stage of the process. This is also based on the fact that no significant comments have been raised during the Scoping Phase of the EIA process which cannot be appropriately mitigated.

The following actions have already been taken in terms of the public participation process:

- 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 (Vista Newspaper) on the 31 March 2022 (see Appendix C1) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement.

- Site notices

  Site notices were placed on site in Afrikaans and English on 24 February 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 28 March 2022. Photographic evidence of the site notices is included in Appendix C2.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, has been directly informed of the EIA process on 02 June 2022 via registered post, telephone calls, WhatsApps and emails (as relevant). The Background Information Document (BID) was distributed with the

notification. For a complete list of I&APs with their contact details see Appendix C3 to this report. It was expected from I&APs to provide their inputs and comments by 04 July 2022.

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via registered post, WhatsApp or email (as relevant) to all surrounding landowners and occupiers on 02 June 2022. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C3. The surrounding landowners were given the opportunity to raise comments by 04 July 2022. Refer to Figure 5.7.

- Circulation of Draft Scoping Report

  Copies of the draft Scoping report were provided to all I&APs via courier, Dropbox and/or email (as relevant) as part of the Scoping Phase. Hard copies of the report were made available on request. I&AP's and organs of state were requested to provide their comments on the report within 30-days of the notification of availability of the draft Scoping Report. The 30-day review and comment period was from 11 November 2022 until 12 December 2022. All issues identified during the 30-day review and comment period were recorded and documented and compiled into a Comments and Response Report (Appendix C6) included as part of the Final Scoping Report for decision-making.

  Acceptance of the Scoping Report and plan of study for the EIA has been received from the DFFE and is dated 20 February 2023. The requirements of the Acceptance of Scoping have been addressed and considered as part of this Final EIA Report. Refer to section 1.7 of this report.

- Circulation of the Draft Environmental Impact Assessment Report

  All registered I&APs and State Departments were informed of the availability of the draft EIA Report on 05 May 2023 and were requested to provide their comments within 30 days (refer to Appendix C4). The 30-day review and comment period was from 05 May 2023 to 05 June 2023. All comments received during this period have been included in this Final EIA Report submitted to the DFFE for decision-making (Appendix C). All comments received prior to the release of the draft EIA Report are also included in Appendix C.

  The Comments and Responses report is included as Appendix C6 of this Final EIA Report.

- Circulation of decision and submission of appeals:

  Notice will be given to all identified and registered I&APs of the decisions taken by the DFFE on the Application for EA. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decisions 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.

5.2.2 Consultation process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C3, C4 and C5.

5.2.3 Registered I&APs

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

This report is the Final Environmental Impact Report. The draft Environmental Impact Report was made available to all potential and/or registered I&APs and State Departments. They were provided with a copy of the draft EIA Report and were requested to provide written comments on the report within 30 days. All issues identified during this review period, and previous review periods (i.e. Scoping Phase), have been documented and responded to in the Comments and Response Report included as part of this Final EIA Report (Appendix C6).

All comments received during the Scoping Phase, and prior to the release of the draft EIA Report for the 30-day review and comment period was also included in the draft EIA Report as Appendix C4 and C5 which provided I&APs an opportunity to confirm that their comments raised during the Scoping Phase have been included and considered as part of the EIA Phase.

5.2.4 Issues raised by I&APs and consultation bodies

To date, no significant comments or issues have been raised by registered I&APs as part of the EIA phase. All original comments received are included in Appendix C5 of this Final EIA Report. All comments have been included and responded to in the comments and responses report (Appendix C6).

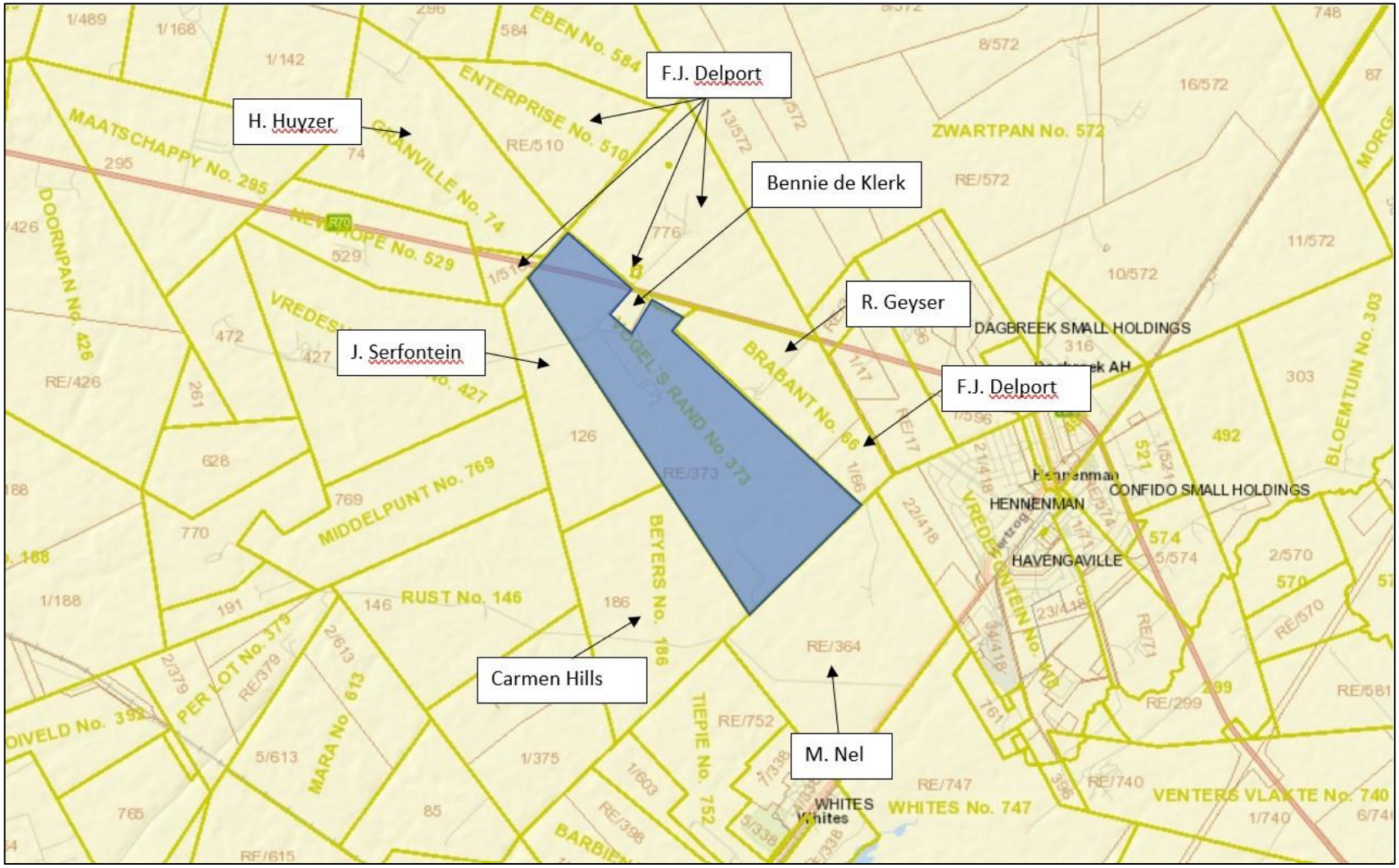


Figure 5.7: Surrounding Landowners to the affected property (blue polygon)

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributes associated with the preferred alternative (i.e., the location of the site and development footprint within the affected property assessed for the 20MW solar energy facility).

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 area under assessment with an extent of 70ha) exclusively consists of land used for agricultural activities, limited sensitive areas from an ecological conservation point have been identified which include a seasonal drainage channel located along the southern and western boundaries of the area under assessment. The features found within the area under assessment are described in more detail below.

5.3.1.1 Geology, soils, agricultural potential and land use

According to the Agriculture Compliance Statement (attached in Appendix E4) the site is on gently sloping land with a southerly aspect. Slope gradient is steeper at the top (3%). Below the boundary the slope is approximately 1%. The geology is Adelaide Subgroup sandstone and mudstone with dolerite sills in places. The entire site falls within one land type, Bc30. The land type comprises mostly soils with limited depth of the Bainsvlei and Westleigh soil forms, but it does also include deep soils predominantly of the Hutton and Avalon soil forms. The on-site soil investigation found that the soils across the site have limited depth. In the relatively low rainfall of the site (494 mm per annum), soils without sufficient depth (more than 800 mm) have too little moisture reservoir to support viable cropping. The site is used only for grazing. The long-term grazing capacity of the site is 7 hectares per large stock unit.

The Geotechnical Feasibility Assessment (Appendix E8) has indicated the following geotechnical conditions and constraints associated with the site:

- The on-site transported and residual soils have a pinhole to voided soil structured, with a collapse potential.
- Expected shallow seasonal seepage water conditions and/or saturated soil profiles (during and immediately after heavy and/or continuous downpours) based on the presence of the fairly prominent pedogenic formation present in the upper and lower soil horizons.
- The transported colluvium, slightly calcreteous colluvium and residual dolerite generally have a shattered soil structure. The transported colluvium, slightly calcreteous colluvium and residual dolerite is expected to have a medium heave potential.

- The transported soils are generally deemed compressible due to the nature of deposition and unconsolidated state. The transported horizons encountered on the centre to southern portions of the site are relatively thick. Considering the encountered conditions, a moderate soil compressibility can be expected for the soils in the centre to southern portions of the site.
- Considering the nature of the upper soil horizons and topography of the site, the on-site soils are expected to have an intermediate to high susceptibility to erosion, especially when cleared and subjected to concentrated water flow.
- It is expected that the highly weathered dolerite can be excavatable/rippable with a larger excavator, dozer and/or excavator with pneumatic tools in unconfined excavation conditions.
- Surface related instability due to undermining is not of any concern for the development.
- The site is not underlain by potentially soluble formations such as dolomite or limestone. Surface related instability due to soluble rock formations is not of any concern.
- Steep slope angles are not present on-site. The regional slopes do not pose any concern for slope related hazards such as global failures, landslides or mudflows.
- No unstable natural slopes are present locally or regionally.
- The site falls within seismic active Zone II (SANS10160-4, 2017). The structural engineer should consider the possible impact of seismicity on the structures under consideration, as guided by the national standards (SANS10160-4, 2017).
- The site is not situated in or adjacent to any prominent rivers or drainage features that poses a flood risk.

When considering the DFFE Screening Tool Report (Appendix B), the classified land capability of the site is 8, which translates to a medium agricultural sensitivity. The classification of the site as high agricultural sensitivity (red in Figure 5.8 below) is because the land is classified as cropland in the data et used by the screening tool. However, that dataset is outdated. The lands indicated as croplands on the screening tool are not currently under crops and have not been for at least 13 years according to the historical imagery available on Google Earth. All cropping on these lands was stopped and they are now used only for grazing. These lands should therefore no longer be classified as cropland or classified as high sensitivity because of it. The high agricultural sensitivity classification by the screening tool as a result of cropping status is therefore disputed by the Agricultural Compliance Statement (Appendix E4).

Figure 5.8: Agricultural sensitivity of the site as per the results of the DFFE Screening Tool Reports (Appendix B)

This site sensitivity verification verifies the entire site as being of less than high agricultural sensitivity, with a land capability value of 7. The land capability value is in keeping with the combination of soil and climate that makes the site too marginal for crop production. The required level of agricultural assessment is therefore confirmed as an Agricultural Compliance Statement.

5.3.1.2 Vegetation, topography and landscape features

The area drains towards the southeast and no rivers or ridges are located within close proximity to the site. The site 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 preferred site is located at an above mean sea level (amsl) of approximately 1446m at the highest elevation and at an amsl of 1413m at the lowest elevation. Elevation profiles were taken over a 10km radius from the site from all 8 wind directions. The site lies completely within Dry Highveld bioregion.

The vegetation of the area under assessment (refer to Figure 5.9) belongs to the endangered Vaal-Vet Sandy Grassland vegetation type (Gh 10) (Mucina & Rutherford 2006). This vegetation type occurs at altitudes ranging between 1260-1360 m within the North West and Free State Provinces. It occurs on plains dominated areas and consist of undulating terrain.

The dominance of the vegetation by the climax grass *Themeda triandra* is characteristic. Areas that are heavily overgrazed are characterised by the prominence of the grasses *Elionurus muticus* and *Cymbopogon spp*. The vegetation type is found on aeolian and colluvial sand overlying sand and mudstone.

Figure 5.9: Approximate location (white star symbol) of the area under assessment within the Vaal-Vet Sandy Grassland vegetation type (Gh 10)

The vegetation is dominated by the grasses *Anthephora pubescens, Aristida congesta, Cymbopogon caesius, Cynodon dactylon, Digitaria argyrograpta, Elionurus muticus, Eragrostis chloromelas, Setaria sphacelata, Themeda triandra, Eragrostis trichophora, Heteropogon contortus*, and the forbs *Stachys spathulata, Barleria Macrostegia, Geigeria aspera, Monsonia burkeana, Hermannia depressa, Hibiscus pusillus Selago densiflora*. The low shrubs *Pentzia globosa* and *Ziziphus mucronata* are also prominent.

This vegetation type is regarded as being endangered with only 0.3% statutorily conserved of the target of 24%. More than 60% is already transformed due to cultivation and overgrazing. The vegetation of the largest section of the study area shows little resemblance with this vegetation type, with only vegetation unit 3 showing some resemblance in the dominance of the grass *Themeda triandra* only, but with most of the other species characteristic for this vegetation type, not present.

Vegetation Units:

The vegetation units on the site vary according to soil characteristics, topography, and land use. Vegetation units were identified in the area under assessment and can be divided into four distinct vegetation units according to soil types and topography (Figure 5.10 and Table 5.1). The units include:

1. Seasonal Drainage Channel
2. Planted pastures
3. *Themeda triandra* grassland
4. Degraded areas

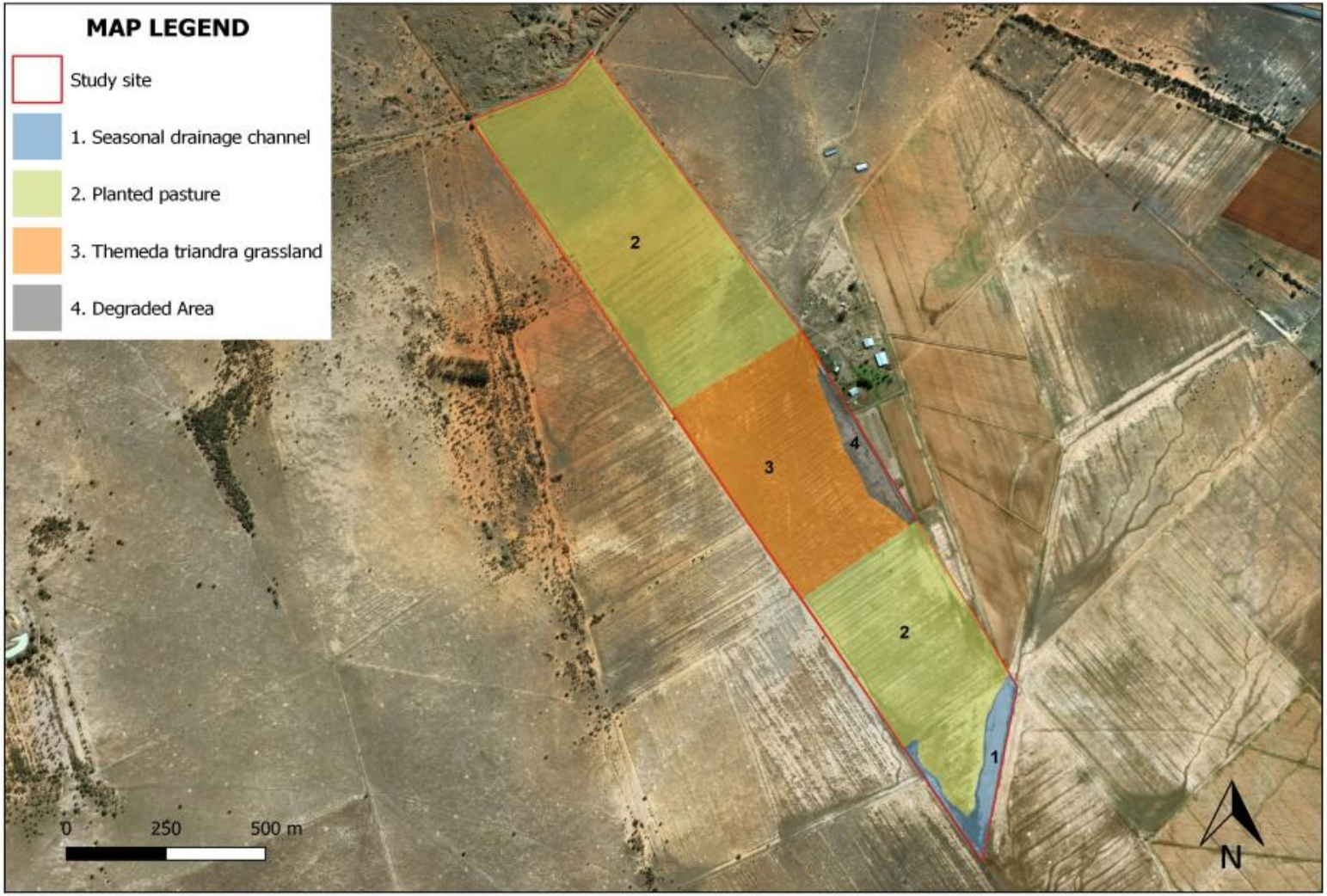


Figure 5.10: Vegetation units present within the area under assessment for the development of the 20MW solar energy facility

Table 5.1: Summary of the Vegetation units present at the site under assessment

Vegetation Unit	Description	Characteristics	Photograph
Seasonal Drainage Channel	• This seasonally wet drainage channel is located along the south-eastern and a small section of the south-western boundary of the site. • The area forms a 3-5m wide channel and is dominated by grasses. • The herbaceous layer dominates the vegetation and consists of short-medium tall grasses that have the highest cover. • The vegetation is dominated by the grasses *Digitaria eriantha, Eragrostis plana* and *Paspalum dilatatum.* Other species present include the grasses *Chloris gayana, Urochloa mosambicensis* and the forbs *Persicaria lapathifolia, Schoenoplectus corymbosus* and *Verbena bonariensis.* Single individuals of the woody *Searsia lancea* and the dwarf shrub *Pentzia globosa* are also present in the channel. • No red data species were found to be present in this unit. • Alien plant species - *Verbena bonariensis*.	• Vegetation Structure: Short-medium tall grassland • Topography: N/A • Soil: Clay - Loam • Unit size: 2.96ha • Need for rehabilitation: Medium • Conservation Priority: High • Red data species: None observed • Protected species: None observed	
Planted pastures	• This vegetation unit is the largest section of the area under assessment and occurs in the southern and northern sections of the site. The soil is deep loamy red with no rocks present. • There are no trees present and the grasses have the highest cover followed by the forbs. • The area is used for the planting of pastures and is dominated by the grasses Dig*itaria eriantha, Eragrostis plana, Aristida congesta subsp. barbicollis* and *Chloris virgata*. The dwarf shrub *Pentzia globosa* is prominent throughout the	• Vegetation Structure: Medium tall grassland • Topography: Mostly level with slight south-eastern slope. • Soil: Red Loam • Unit size: 52.2 ha • Need for rehabilitation: Medium - high • Conservation Priority: Low • Red data species: None observed • Protected species: None observed	

	area. Other species present include the forbs *Felicia muricata, Conyza bonariensis, Tagetes minuta* and *Nidorella hottentotica*. • The alien plant specie *Verbena brasiliensis is* present in this vegetation unit.		
Themeda triandra grassland	• This vegetation unit is located in the central part of the site and comprises 43.8 ha. • The area is dominated by grasses with no rocks present. • The vegetation is dominated by the grass *Themeda triandra* with *Cynodondactylon* and *Eragrostis chloromelas* prominent in patches. Other species present include the grass *Panicum natalense* and the forbs *Conyza bonariensis*, Hypoxis argentea and *Gomphrena celosioides*. There are few woody species present with the dwarf shrub *Pentzia globosa* present throughout the unit.	• Vegetation Structure: Medium tall grassland • Topography: Level with slight south eastern slope (1-3°) • Soil: Red Loam • Unit size: 19.5ha • Need for rehabilitation: Medium • Conservation Priority: Low - Medium • Red data species: None observed • Protected species: None observed	
Degraded areas	• This vegetation unit occurs as a narrow section along the northern boundary in the central part of the site. • The area is dominated by grasses with no rocks present. • The vegetation is characterised by the dominated by the grasses *Cynodon dactylon and Eragrostis chloromelas*. Other species present include the grass *Eragrostis plana and the forbs Schkuhria pinnata and Solanum incanum*. There are few woody species present with the dwarf shrub *Pentzia globosa* present throughout the unit. • The alien plant species *Cirsium vulgare is* present in this vegetation unit.	• Vegetation Structure: Short grass and forb land • Topography: Level with slight south eastern slope (1-3°) • Soil: Red Loam • Unit size: 2.4ha • Need for rehabilitation: High • Conservation Priority: Low • Red data species: None observed • Protected species: None observed	

Protected Areas, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)

According to the Department of Forestry, Fisheries and Environment's South African Protected Areas Database (SAPAD, Quarter 3, 2021) the project site is not located near / within 5km of a protected area. The Thabong Game Ranch that occurs 5.3km west of the project is the closest protected area.

The Free State Biodiversity Conservation Plan has been considered for the identification of the relevant Critical Biodiversity Areas (CBA) associated with the proposed development. Most of the proposed development footprint represents other natural areas (ONA), including the seasonal drainage channel (VU1).

Refer to Figure 5.11.

Figure 5.11: Ecosystem classification of the site according to Free State Nature Conservation for the site

Furthermore, the project site does not infringe on any focus areas associated with the National Protected Areas Expansion Strategy (NPAES). The closest NPEAS is located to the 15km southeast of the project and is known as the Free State Highveld Grassland NPAES.

Species of Conservation Concern

A list of red data plant species previously recorded in the grid square in which the proposed development is planned was obtained from SANBI. 13 red listed plant species occur in the Quarter Degree Square however no species were recorded in the site and marginal habitat exists on site.

The DFFE Screening Report also did not highlight any red listed flora (Appendix B).

Protected Plants in terms of the Free State Nature Conservation Ordinance

Plant species are also protected in the Free State Province according to the Free State Nature Conservation Ordinance. According to this ordinance, no person may pick, import, export, transport, possess, cultivate, or trade in a specimen of a specially protected or protected plant species. Communication with Provincial authorities indicates that a permit is required for all these species if they are expected to be affected by the proposed project.

After a detailed survey was conducted during March 2022, no protected plants in terms of the Free State Nature Conservation Ordinance were present on the site.

Declared Invasive Alien Species

The Alien and Invasive Species Regulations (GNR 599 of 2014) are stipulated as part of the National Environmental Management: Biodiversity Act (10/2004). The regulation listed a total of 559 alien species as invasive and further 560 species are listed as prohibited and may not be introduced into South Africa. Below is a brief explanation of the four categories of Invasive Alien Plants as per the regulation.

Category 1 plants are prohibited plants which must be controlled or eradicated. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals or the environment.

- Category 1a: Plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned
- Category 1b: Plants are widespread invasive species controlled by a management program.

Category 2 plants are invaders with certain useful qualities, such as commercial use or for woodlots, animal fodder, soil stabilisation, etc. These plants are allowed in demarcated areas under controlled conditions and in biocontrol reserves.

Category 3 plants are alien plants that are currently growing in, or have escaped from areas such as gardens, but that are proven invaders. No further planting is allowed (except with special permission), nor trade in propagative material. Existing plants may remain but must be prevented from spreading. Plants within the flood line and watercourses must be removed (Bromilow, 2010).

The following alien invasive and exotic plant species were recorded on site during the surveys as stipulated in the Alien and Invasive Species Regulations (GNR 599 of 2014):

- *Circium vulgare (Savi) Ten*. – Category 1b
- *Verbena brasiliensis Vell.* - Category 1b

Medicinal Plants

Two medicinal plants were recorded on the site (refer to Table 5.2). None of the medicinal plant species present are threatened and occur abundantly within the province.

Table 5.2: List of medicinal plant species identified on the site

Plant name	Plant part used	Medicinal use	Vegetation unit
Vachellia karroo	Leaves, bark and gum	Diarrhoea & dysentery Gum: colds, oral thrush & haemorrhage.	1; 2
Ziziphus mucronata	Roots, bark or leaves	Cough & chest problems; diarrhoea; pain relief	2

5.3.1.3 Wetlands and Riparian Features

The site lies completely within the Middle Vaal Water Management Area (WMA) and is located within the C42J quaternary catchment. A Seasonal Drainage channel (vegetation unit 1) occurs along the south-eastern boundary and a small section along the southern boundary of the study site (refer to Figure 5.12). It forms a moderate to narrow waterway that channels surface water received from the adjacent and upland areas of the planted pastures and cultivated fields and channels it towards the south-east. The channel is approximately 1m deep in areas, while other sections are ill-defined and is similar in species composition and structure to that of the surrounding grasslands/planted pastures. The channel is located within the site but outside of the development footprint.

Single individuals of woody species occur in areas but covers less than 1% of the area. The vegetation is mostly natural and although these areas are used for grazing by cattle, it has not been overgrazed with the vegetation cover remaining high and the vegetation composition being natural typical of seasonally wet systems. Watercourses are important ecosystems not only due to their water channeling and retention functions, but also due to the habitat it provides for various insect and aquatic organisms contributing to high biodiversity. From a plant ecological point of view this area is regarded as having a high conservation value and ecosystem functioning.

No other wetlands or riparian features are present in the site.

Figure 5.12: Seasonal drainage channel located on the southern border of the site

The development footprint for the facility has been placed within the site considering the need to avoid the sensitive surface water feature, as per Figure 5.12 above. Therefore, this sensitive feature will not be directly impacted by the developments.

5.3.1.4 Climate

The project is situated within the summer and autumn rainfall region with very dry winters and frequent frost that occurs during the colder winter months (refer to Figure 5.13). The spatial and temporal distribution of rainfall is very complex and has great effects on the productivity, distribution and life forms of the major terrestrial biomes. The mean annual precipitation for the region is around 560mm. The mean annual temperature for the area is 15.2°C, and the mean annual frost days is 43 days. Mean Annual Potential Evaporation is 2226mm, with Mean Annual Soil Moisture Stress of 78%.

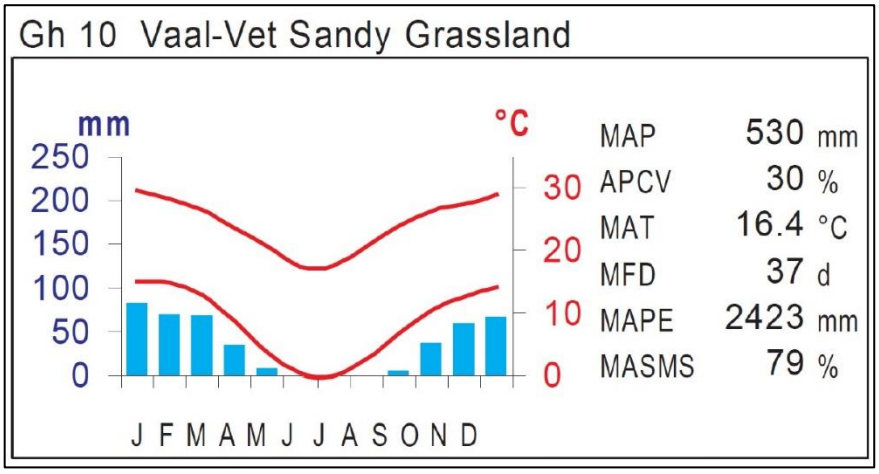


Figure 5.13: Climate diagram representative of the site (Mucina & Rutherford, 2007)

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.

Avifauna

According to the Avifaunal Impact Assessment (Appendix E2) the project is situated in an area of moderate avifaunal diversity, and the site is in the endangered Vaal-Vet Sandy Grassland ecosystem type. Much of the surrounding area has been impacted by pasture production and grazing practices. The resident avifauna is represented by relatively moderate species richness and abundance, for which the total transformation of habitat will generate impacts.

The typical species occurring on the site are common across the western highveld, with good representation from the widespread larks, pipits, cisticolas, finches, widowbirds, bishops, and whydahs in particular. Aerial feeding swallows were also well represented. Most palearctic migrants were not present on the site during the late summer assessments, and most intra-African migrants appeared to have departed. Raptors were poorly represented, as were gamebirds.

There are Red Data species that could possibly occur on site, even as vagrants and the likelihood of their occurrence must be assessed. No Red Data species were recorded during the surveys, although suitable habitat does exist on site for the following species that has a reasonable likelihood of occasionally occurring on site:

- *Secretarybird*- Vulnerable. Not recorded in the pentads or during the site visit but habitat on site appears suitable, and, therefore, should be expected to have at least a reasonable likelihood of occasionally occurring on site.
- *Lanner Falcon*- Vulnerable. Not recorded in the pentads or during the site visit but habitat on site appears suitable, and, therefore, should be expected to have at least a reasonable likelihood of occasionally occurring on site.
- *Red-footed Falcon*- Near Threatened. Not recorded in the pentads or during the site visit but habitat on site appears suitable, and, therefore, should be expected to have at least a reasonable likelihood of occasionally occurring on site
- *Blue Crane*- Near-Threatened. Not recorded in the pentads or during the site visit but habitat on site appears suitable, and, therefore, should be expected to have at least a reasonable likelihood of occasionally occurring on site.
- *Abdim's Stork*- Near-Threatened. Not recorded in the pentads or during the site visit but habitat on site appears suitable, and, therefore, should be expected to have at least a reasonable likelihood of occasionally occurring on site.
- *Black-winged Pratincole*- Near Threatened. Not recorded in the pentads or during the site visit. Habitat suitability is marginal on the site but is expected to occasionally occur in the surrounding croplands.

The Red Data species listed above as occurring in the wider area or having reasonable likelihood of even occasional occurrence will be considered in the impact assessment and the methodology for mitigations.

In terms of range-restricted or endemic species, South Africa has a rich diversity of nationally and regionally endemic species that are found nowhere else on earth and, therefore, warrant consideration for assessment of sensitivity to potential developments. The following endemic or near-endemic (most of the global range is within South Africa's borders) species were recorded either during prior SABAP2 assessments or during this assessment:

- *Blue Korhaan*- not recorded on site but recorded during SABAP2 assessments for the wider pentad. Endemic to South Africa, Lesotho and Swaziland.
- *Cloud Cisticola*- recorded on site at numerous transects. Near-endemic.
- *Fairy Flycatcher* - not recorded on site but recorded during SABAP2 assessments for the wider pentad. Near-endemic.
- *Pririt Batis*- not recorded on site but recorded during SABAP2 assessments for the wider pentad. Near-endemic.
- S*outh African Cliff Swallow*- recorded on site at one transect. Breeding Endemic to South Africa, Lesotho and Swaziland.

All of the endemic or near-endemic species listed above that have either been confirmed as occurring on site during this assessment or during past SABAP2 assessments have wide distributional ranges and reportedly healthy populations and should not present and substantial threats as a result of development of this site.

Fauna

Much of the large and medium-sized mammal fauna that previously occurred on the site is now locally extinct or occurs in small, fragmented populations in reserves. Most of the habitat types are fragmented. Therefore, the expected mammalian richness on these areas is considered low, although slightly higher richness values are expected from the more intact grassland, woodland and wetland habitats.

The Highveld Ecoregion contains a higher number of mammals, although only the orange mouse (*Mus orangiae*) is restricted to the ecoregion, and the rough-haired golden mole (*Chrysospalax villosa*) is near-endemic. The ecoregion also supports populations of several large mammal species, some of which are rare in southern Africa. Among these are the brown hyena (*Hyaena brunnea*), African civet (*Civettictis civetta*), leopard (*Panthera pardus*), pangolin (*Manis temminckii*), honey badger (*Mellivora capensis*), striped weasel (*Poecilogale albinucha*), aardwolf (*Proteles cristatus*), oribi (*Ourebia ourebi*), and mountain zebra (*Equus zebra hartmannae*).

Predators that still roam freely in the area include larger predators such brown hyena, while smaller predators such as caracal, serval and honey badger are common throughout the larger area. Antelope species such as duiker and steenbok will roam freely through the area and are not restricted by game fences. Smaller mammal species such as honey badgers and serval can become habituated to anthropogenic influences, while other species such as brown hyena will

rather move away from the construction activities and will seldom use the area. The wetlands/water features are an important habitat and dispersal corridor for moisture-reliant small mammals.

Most mammal species are highly mobile and will move away during construction of the solar development. The most important corridors that need to be preserved for free-roaming mammal species in the area include the riparian zones, wetlands/water features and indigenous grasslands.

Twenty-nine amphibians occur within the ecoregion, but none are endemic. Breeding habitat of frogs and toads can be found mostly in the permanent wet zone of the wetlands and dams in the larger area. Amphibian species potentially occurring in the larger area include Common River Frog, Natal Sand Frog, Gutteral Toad, Raucous Toad and Bubbling Kassina. These species are non-threatened and widespread, and as such the development will not have any impact on amphibian conservation within the region. The seasonal drainage channel could provide habitat for the red listed giant bullfrog, and therefore the recommended mitigation measures provided by the specialist must be adhered to.

Relatively few reptile species occur within the Highveld Ecoregion, mainly due to its cool climate. However, the ecoregion supports some of Africa's most characteristic reptile species, including Nile crocodile (*Crocodylus niloticus*), African rock-python (*Python sebae*), water monitor (*Varanus niloticus*) and veld monitor (*Varanus exanthematicus albigularis*). There are two strict endemic reptiles: giant girdled lizard (*Cordylus giganteus*), and *Agama distanti*. Several additional reptile species are near-endemics, including Drakensberg rock gecko (*Afroendura niravia*), giant spinytail lizard (*Cordylus giganteus*), and Breyer's whiptail (*Tetrodactylus breyeri*).

A few terrestrial lizards (Yellow-throated Plated Lizard, Variegate Skink), typical for Highveld Grassveld, are expected to be present. A variety of smaller snake species characteristic for Highveld Grassveld will be present (Common Wolf Snake, Brown House Snake), although some might be dependent on by the presence of dead termitaria. The only venomous snakes, which has been reported as being common, is as expected, the Rinkhals, Mozambique spitting cobra, snouted cobra and the Puffadder for this QDS. All the reptile species are common and widespread, and as such the development will not have any impact on reptile conservation within the region. The Sungazer Lizard occurs in some of the grassland areas, while the southern spiny agama and the striped harlequin snake may occur in small numbers in suitable habitat.

5.3.1.6 Visual Landscape

According to the Visual impact Assessment (Appendix e3), the area drains towards the southeast and no rivers or ridges are located within close proximity to the site.

The site 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 preferred site is located at an above mean sea level (amsl) of approximately 1446m at the highest elevation and at an amsl of 1413m at the lowest

elevation. The landform and drainage described is unlikely to limit visibility. Areas within 5km from the proposed development might have a clear view without taking existing screening into account.

The observers in a 5km radius include:

- Eskom power line infrastructure.
- Sedibeng Water Barbant Substation
- Quarry
- Various homesteads on farms.
- Hennenman
- R70
- Farm roads
- Various urban services within Hennenman
- Livestock grazing and crop farming

Other observers are located outside of the 5km radius from the site which includes the Harmony Masimong 5 Mine, guesthouses located within Hennenman, Glen Harmony Mine, Harmony Gold Saaiplaas mine, Rietspruit and Sandrivier.

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance and is characterised by mines and agricultural developments. Figure 5.14 and Figure 5.15 below indicates the Zone of Theoretical Visibility for the solar power plant and the proposed grid connection corridor.

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

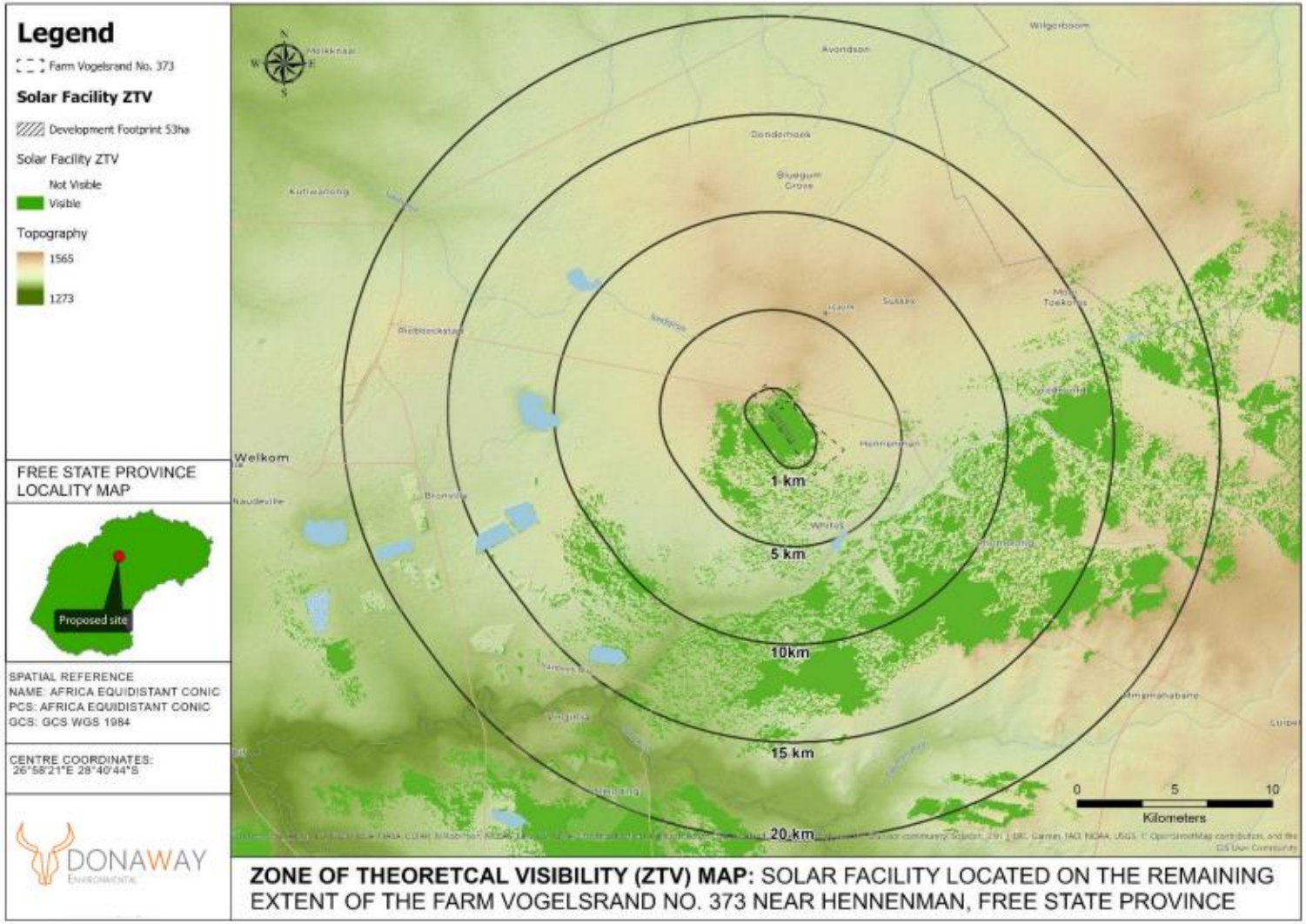


Figure 5.14: Zone of Theoretical Visibility (ZTV) for the project site

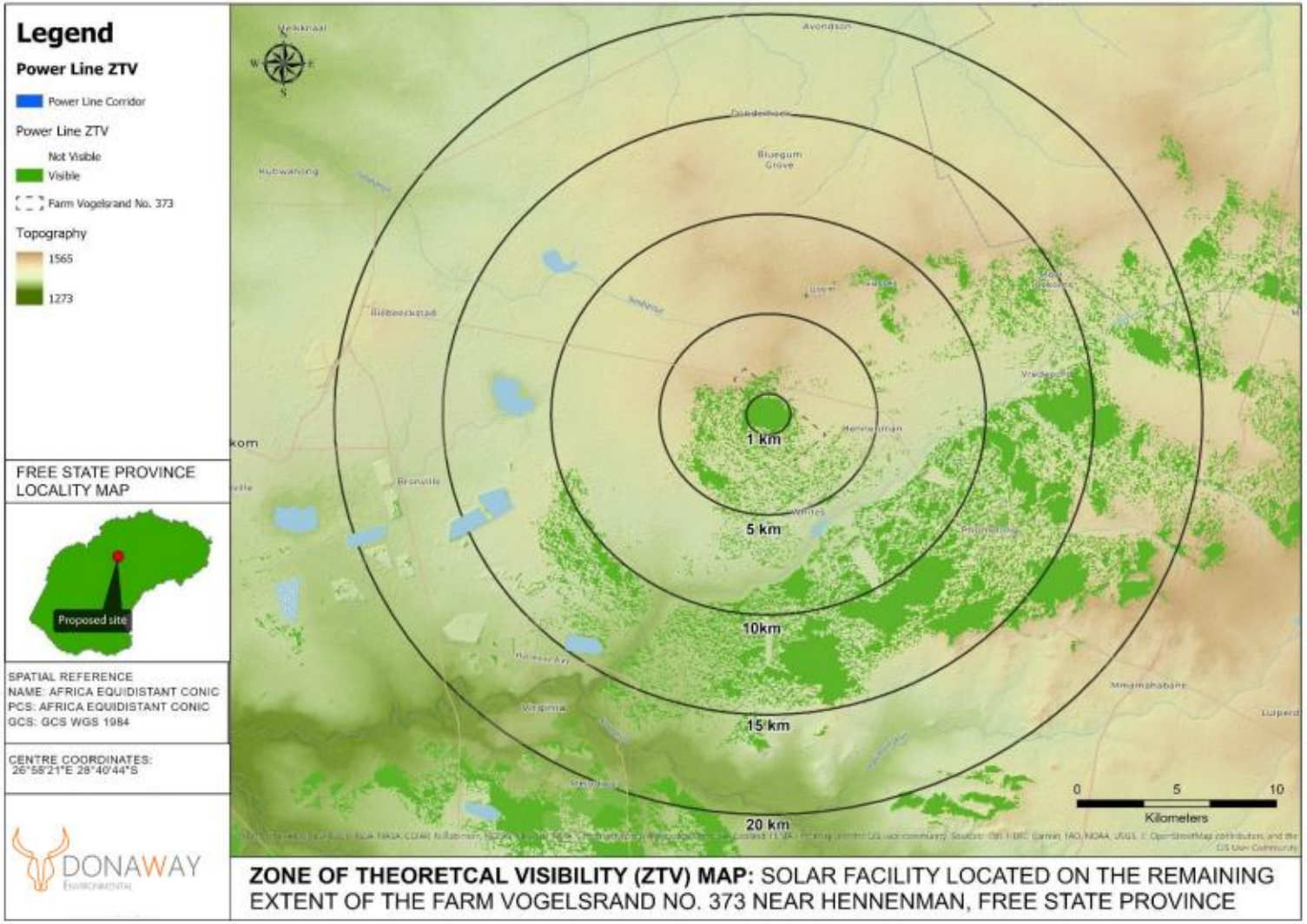


Figure 5.15: Zone of Theoretical Visibility (ZTV) for the proposed grid connection corridor

5.3.1.7 Traffic consideration

According to the Traffic Impact Study (Appendix E7), the existing external road network in the vicinity of the proposed development consist of the R70, S173, S251, S236, Breet St and Hertzog St. Access to the project can be either via the R70 or an unknown gravel road. Two (2) possible access points have been identified for the 20 MW buildable area. The preferred access point is located off an unknown gravel road off the R70. In addition, an alternative access point has been identified, which is located off Regional Route 70 (R70). It must be noted, however, that an extension of the existing gravel tracks may be required.

A formal application for these access points will need to be lodged with the Matjhabeng Local Municipality and the Free State Department: Police, Roads and Transport. The formalisation of these access points 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. Furthermore, an additional 15 km of smaller tracks may be required, for cleaning and maintenance of the solar modules.

Two (2) possible ports of entry has been identified from where the solar panel technology and large electrical components will be transported, namely: Durban and Richards Bay. The distance from Durban to the project, via road, is approximately 585 km via the N3 and N5 and from Richards Bay to the project is approximately 685 km via the N5. It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route.

5.3.2 Description of the socio-economic environment

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

5.3.2.1 Socio-economic conditions

The project is proposed within the Free State Province, although is the third-largest province in South Africa, it has the second-smallest population and the second-lowest population density. It covers an area of 129 825km² and has a population of 2 834 714 – 5.1% of the national population. Languages spoken include Sesotho (64.4%), Afrikaans (11.9%) and Zulu (9.1%). The Free State Province contributes 5.4% to South Africa's total gross domestic product (2006).

Free State Province is the landlocked core of the country. It is centrally placed, with good transport corridors to the north and the coast. It is the third biggest of South Africa's nine provinces in terms of size, and primary agriculture is a key economic sector. Mining is also important but has been declining steadily since 2008.

The Free State is situated in the heart of the country, between the Vaal River in the north and the Orange River in the south, bordered by the Northern Cape, Eastern Cape, North West, Mpumalanga, KwaZulu-Natal and Gauteng provinces, as well as Lesotho. The Free State is a rural province of farmland, mountains, goldfields, and widely dispersed towns. This province is an open, flat grassland with plenty of agriculture that is central to the country's economy. Mining is its largest employer.

Bloemfontein is the capital and is home to the Supreme Court of Appeal, as well as the University of Free State and the Central University of Technology. The province also has 12 gold mines, producing 30 percent of South Africa's output.

Agriculture is a key economic sector – 8% of the country's produce comes from Free State. In 2010, agriculture provided 19.2% of all formal employment opportunities in the region. The economy is dominated by agriculture, mining and manufacturing. Known as the 'bread-basket' of South Africa, about 90% of the province is under cultivation for crop production. It produces approximately 34% of the total maize production of South Africa, 37% of wheat, 53% of sorghum, 33% of potatoes, 18% of red meat, 30% of groundnuts and 15% of wool. The province is the world's fifth-largest gold producer, with mining the major employer.

Other mineral resources – gold, diamonds, and low-grade coal – are also important to the province; mining contributed 9% to the local economy and employed some 33 000 people in 2010. Other commodities include clay, gypsum, salt, and uranium.

Lejweleputswa District Municipality

The Lejweleputswa District Municipality is a Category C municipality situated in the north-western part of the Free State. It borders the North West Province to the north, Fezile Dabi and Thabo Mofutsanyana to the north-east and east respectively, Mangaung and Xhariep to the south, and the Northern Cape Province to the west.

The District Municipality makes up almost a third of the province, covering an area of 32 287km^2, and consists of the following five local municipalities, with approximately 18 towns distributed throughout: Masilonyana, Tokologo, Tswelopele, Matjhabeng and Nala.

It is accessible from Johannesburg, Cape Town, Klerksdorp and Kimberley along the N1, one of the country's main national roads. The main economic sectors include: Mining (31%), construction, transport, electricity and trade. In 2011 the Municipality had a population of 624 746 with a dependency ratio of 51.3. By 2016 the population has increased to 646 920 and the dependency ratio was reduced to 46.2.

Matjhabeng Local Municipality

The Matjhabeng Local Municipality is a Category B municipality situated in the Lejweleputswa District in the Free State. It is bound by Nala to the north, Masilonyana to the south, Tswelopele to the east and Moqhaka to the west and covers an area of 5 690km^2. It is one of five municipalities in the district. Matjhabeng represents the hub of mining activity in the Free State Province.

There is one formal land-based protected area in the municipality, being the Willem Pretorius Nature Reserve. There are no Ramsar sites. There are six towns in the municipality, namely, Allanridge, Henneman, Odedaalsrus, Ventersburg, Virginia and Welkom. The main economic sectors in the municipality are mining and manufacturing.

5.3.2.2 Cultural and heritage aspects

According to the Heritage Impact Assessment (Appendix E5), archaeological sites spanning the Earlier, Middle and Later Stone Age have been found in the region despite the extensive agricultural transformation of the area. However, despite this, no heritage resources of significance were identified by Van der Walt (2013) in his assessment of the adjacent farm. Additionally, no significant archaeological sites have been recorded in the vicinity of the project area on SAHRIS. Van der Walt (2013) notes that "some MSA finds might be possible around pans on the farm. It is important to note that the lack of sites can be attributed to a lack of sustainable water sources (no pans exist in the development footprint) in the development area as well as the lack of raw material for the manufacturing of stone tools.

No Sites dating to the Early or Middle Iron Age have been recorded or is expected for the study area. The same goes for the Later Iron Age period where the study area is situated outside the western periphery of distribution of Late Iron Age settlements in the Free State. However to the north of the study area, ceramics from the Thabeng facies belonging to the Moloko branch of the Urewe tradition were recorded at Oxf 1 and Platberg 32/71 (Maggs 1976, Mason 1986). Similarly to the east Makgwareng ceramics belonging to the Blackburn Branch of the Urewe tradition was recorded (Dreyer 1992 and Maggs 1976). There is however a low likelihood of finding sites dating to this period in the study area."

A survey was conducted on foot of the area under assessment and sought to assess the presence and significance of archaeological occurrences within the site. There was no evidence of Stone or Iron Age archaeology within the site. No graves were identified within the survey and visibility was reasonably good for stone structures, so the latter finding could be considered comprehensive. However, the substantial grass cover and soil formation across the entire footprint was a pertinent constraint to documenting stone artefacts and other smaller potential surface remains such as ceramics. The field assessment did not document any archaeological remains.

<u>Palaeontology</u>

According to the SAHRIS Palaeosensitivity Map the development sites are underlain by sediments of moderate and Very High fossil sensitivity (Figure 5.16). The Adelaide Formation of the Beaufort Group is the very highly sensitive formation and caenozoic regolith is the moderately sensitive formation underlying the development area according to the extract from the CGS 2726 Kroonstad Geology Map.

A desktop Palaeontological assessment (2013) was completed by Millsteed for an adjacent development which is of relevance here. Millsteed (2013) notes that "The Cainozoic regolith and the Adelaide Subgroup are both potentially fossiliferous and their stratigraphic equivalents are known to contain scientifically important fossil assemblages elsewhere in South Africa. Accordingly, it may be reasonably expected that significant fossils may be present within the project area." He goes on to note that "Thus, the historical farming processes have probably destroyed any fossil materials that may have been present at surface in these areas. Similarly, where present the regolith cover would hide any fossils contained within the underlying Adelaide Subgroup from discovery. The potential for a negative impact on the fossil heritage of the area can be quantified in the following manner. Any fossil materials that may have been present at/or near the surface in the cultivated regolith will have been historically destroyed and the likelihood of any negative impact is categorised as negligible. The possibility of a negative impact on the depth interval between the maximum depth of ploughing and the maximum depth of excavations within the regolith is categorised as low (due to the scarcity of fossils in general)."

Although the presence of the Adelaide Subgroup would normally require a field scoping study be conducted before excavation takes place, the entire footprint of the proposed development has been modified for agricultural purposes and is covered by dense grasses. This makes it unlikely that a field scoping study would provide any more information on the likelihood of the project resulting in irreversible loss of the palaeontological heritage. Based on this, along with the presence of Quaternary superficial deposits covering half of the fossiliferous sediments (Beaufort Group), and the lack of fossils finds in the SAHRIS list of heritage resources within close proximity to the development area, it is anticipated that the impact of the development will mainly be low to moderate.

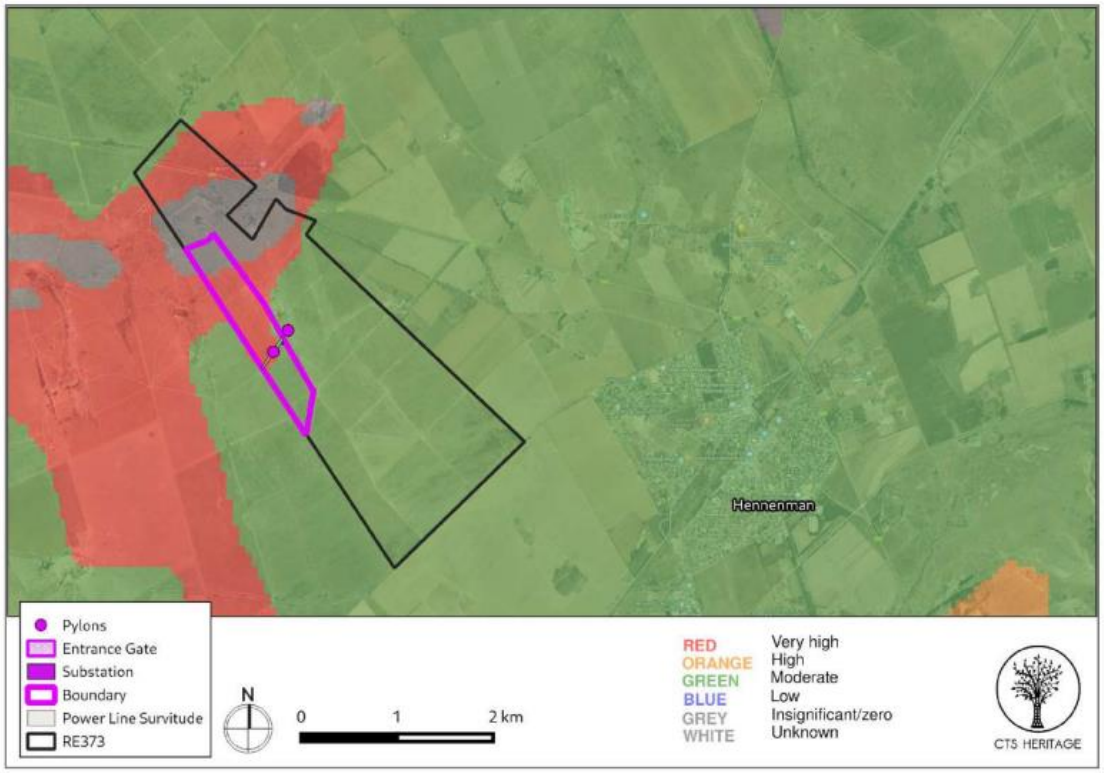


Figure 5.16: Palaeontological sensitivity associated with the site

5.4 SITE SELECTION MATRIX

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

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities (i.e. the grid connection point is located within the affected property which minimizes the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). The Remaining Extent of the Farm Vogelsrand No. 373, on which the project is proposed to be located, is considered favorable and suitable from a technical perspective due to the following characteristics:

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

- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level of topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur. The topographic conditions, which are favourable, minimizes the significance of the impact that will occur during the clearing and leveling of the site for the construction activities.
- Extent of the site: A significant portion of land is required to evacuate the prescribed 20MW and space is a constraining factor in PV facility installations. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. The Remaining Extent of the Farm Vogelsrand No. 373, and the area assessed therein for the placement of the development footprint is considered to provide an opportunity for the successful construction and operation of a solar power plant with a capacity of 20MW, as well as opportunities for the avoidance and mitigation of impacts on the affected environment and sensitive environmental features.
- Site availability and access: The land is available for lease by the developer. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be obtained via a gravel road off of the R70 north of the site.
- Grid connection: In order for the PV facility to connect to the national grid the facility will have to construct an on-site substation, Eskom switching station and a power line from the project site to connect to the Eskom grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site. The grid connection point is located within the affected property which presents an opportunity for the consolidation of infrastructure and disturbance within the affected landscape. An insignificant length of power line will need to be developed for the project.
- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 of this report. The area proposed for development exclusively consists of land used for agriculture, but a water feature is located in the site that has been considered by the developer and avoided by the placement of the facility infrastructure within the development footprint.

It is evident from the discussion above that Remaining Extent of the Farm Vogelsrand No. 373 may be considered favourable and suitable in terms of the site and environmental characteristics. As mentioned previously, no alternative areas on the property have been considered for the placement of the development footprint as the assessed area is considered as appropriate from a technical and environmental perspective. The development footprint of this project will cover a significant portion of the farm, however, provision has been made to exclude any sensitive areas from the facility layout to be developed.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria, the site assessed for the 20MW solar energy facility is identified as preferred due to fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of a Solar Energy Facility on the Remaining Extent of the Farm Vogelsrand No. 373 is the preferred option.

Considering the environmental sensitive features present within the site assessed, the Applicant has proposed a facility layout / development footprint which considers these features, and thereby avoids any direct impact on these features. The layout is assessed as part of this EIA Phase of the project and is considered to be appropriate from an environmental and surface water feature perspective, and is therefore confirmed as preferred for the development of the solar facility. Refer to Figures G3 and I for the layout proposed for development and the associated environmental sensitivity map.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 3. (3)(h) An EIR (...) must include-

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

(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;

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

(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; and

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

(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 assessment report;

6.1 SCOPING METHODOLOGY

The contents and methodology of the Environmental Impact 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 for the proposed 20MW solar energy facility. The method aims at providing a first order cause and effect relationship between the environment and the proposed activities. 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 for the site under assessment on 24 February 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. This assists 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	×			A seasonal drainage channel is located on the southern border of the site.
II. A conservation or open space area		×		Majority of the development footprint is located within an area classified as degraded, with portions classified as other.
III. An area that is of cultural importance		×		None.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous Forest		×		None.
IX. Grass land	×			The site is located in the Vaal-Vet Sandy grasslands which is classified as being endangered.
X. Bird nesting sites		×		The Avifauna Impact Assessment (refer to Appendix D2) does not make any reference to nesting sites on the area earmarked for the development.
XI. Red data species		×		The Avifauna Impact Assessment (refer to Appendix D2) did not record any Red Data Species on site but indicated that they could possibly occur on site.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.

II. Visual Impacts	×			The VIA (refer to Appendix D3) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of 12 months. The noise impact is unlikely to be significant.
IV. Construction of an access road		×		Access will be obtained via a gravel road off the R70 regional road.
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 100 employment opportunities will be created during the construction phase and 10 employment opportunities during the operation phase of the 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 35 years of production is approximately 70m3 per month / 840m³ per annum.
VIII. Job creation	×			Approximately 100 employment opportunities will be created during the construction and 10 employment opportunities during the operational phase of the project.

IX. Traffic generation	×			It is estimated that 72 trips per day will be generated over the 12 month construction period for the SPP.
X. Soil erosion	×			The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		×		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			A seasonal drainage channel is located on the southern border of the site. NFEPA wetlands are located to the north of the project site.
II. A conservation or open space area	×			The project site is located adjacent to a Critical Biodiversity Area 1. Furthermore, the site is located 5.3km from the Thabong Game Ranch.
III. An area that is of cultural importance		×		None.
IV. A site of geological significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. A tourist resort		×		The Goldfields Game Ranch is located ~35km to the south-east. It must be noted that the Springbok Solar Power Plant was recently authorised for development on this property.
VIII. A formal or informal settlement	×			Hennenman (located approximately 4km to the east of the site)

6.1.2 Matrix analysis

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

In order to conceptualise the different impacts, the matrix specifies 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 for the project as included in Table 6.2 below, as well as the key issues identified as included in sections 6.2.1-6.2.3. The table included on the overleaf includes reference to the sections in the respective specialist studies (**Appendix E**) where the details of the in-depth assessment of potential environmental impacts can be obtained for the proposed development.

Furthermore, Tables 6.3-6.5 provides an indication of the significance rating of each identified and assessed impact before and after the implementation of the recommended mitigation measures.

Specialist Study	Impact Assessment (pg.)	Cumulative Impacts (pg.)	Mitigation Measures (pg.)
Ecological Impact Assessment (Appendix E1)	36-41	36-41	Same pages as the impact assessment
Avifauna Impact Assessment (Appendix E2)	42-47	42-47	48-50
Visual Impact Assessment (Appendix E3)	44-56	56-59	Same pages as the impact assessment and pages 61-63
Agriculture Compliance Statement (Appendix E4)	13-21	15-16	21-27
Heritage Impact Assessment (Appendix E5) (including archaeology and palaeontology)	25-26	28-29	30
Social Impact Assessment (Appendix E6)	65-89	89-95	Same pages as the impact assessment
Traffic Impact Assessment (Appendix E7)	21-26	27-29	Same pages as the impact assessment
Geotechnical Feasibility Assessment (Appendix E8)	Not applicable as this is a technical report. The results of the report have been considered as part of this Final EIA Report and assessment of potential impacts included, as well as the associated mitigation measures.		

Table 6.2: Matrix analysis for the 20MW Solar Facility

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

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY	ASPECTS OF THE	POTENTIAL IMPACTS	SIGNIFICANCE AND	MITIGATION OF POTENTIAL IMPACTS	SPECIALIST STUDIES /

			Receptors	**Impact description / consequence**	**Minor**	**Major**	**Extent**	**Duration**	**Probability**	**Reversibility**	**Irreplaceable loss of resources**	**Possible Mitigation**	**Possible mitigation measures**	**Level of residual risk**	
CONSTRUCTION PHASE															
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – a) temporarily required to allow for maintenance of existing infrastructure; b) 2 kilometres or shorter in length; c) within an existing transmission line servitude; and d) will be removed within 18 months of the commencement of development."*	<u>Site clearing and preparation</u> Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. <u>Civil works</u> The main civil works are: • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths –	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Direct habitat destruction • Site clearing and preparation • Seasonal Drainage Channel Degradation • Loss of Fauna & Flora		-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Ecological Impact Assessment (Appendix E1)
			Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance. • Loss of important avian habitats.		-	S	M	Pr	PR	ML	Yes	- See Table 6.3	L	Avifauna Impact Assessment (Appendix E2)
			Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and	L	-

Activity 12(ii)(c) (GN.R. 327): *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse, excluding – (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applied; (cc) activities listed in activity 14 in Listing Notice 2 od 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where*	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 The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.											building materials are fitted with tarpaulins or covers.		
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • 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). • Loss of topsoil.	-		S	S	Pr	PR	ML	Yes	- See Table 6.3	L	Agricultural and Soils Compliance Statement (Appendix E4)
			Geology	• Collapsible soil. • Seepage. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity.	-	-	S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	Geotechnical Feasibility Assessment (Appendix E8)
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the local sewage plant.	-		L	S	D	PR	ML	Yes	-	L	-

indigenous vegetation will not be cleared." 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 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes 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, excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes."* Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output*				• Increase in construction vehicles on existing roads.										
			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, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards.	L	-
			Surface water	• Seasonal Drainage Channel Degradation		-	L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Ecological Impact Assessment (Appendix E1)
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	P	S	D	I	N/A	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E7)
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close	-		L	S	D	CR	NL	Yes	- See Table 6.3	M	Visual Impact Assessment

is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure." Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan."* Activity 10 (b)(i)(ee)(gg)(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 Free State, (i) outside urban areas,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, (gg) areas within 10 kilometers*				proximity to proposed facility. • Lighting impacts. • Solar glint and glare impacts. • Visual sense of place impacts.										(Appendix E3)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Delivery and construction trips will be insignificant when compared to the Average Daily Traffic (ADT) and will not affect the existing Level of Service (LOS). It can therefore be concluded that, on both routes, no mitigation measures will be necessary.	L	Traffic Impact Assessment (Appendix E7)
			Health & Safety	• Air/dust pollution. • Road safety. • Impacts associated with the presence of construction workers on site and in the area. • Influx of job seekers to the area. • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. • Increased risk of veld fires.		-	L	L	Pr	PR	ML	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E7)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not	L	Social Impact Assessment (Appendix E7)

from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA… and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland." <u>Activity 12 (b)(i)(ii)(vi) (GN.R 324):</u> *"The clearance of an area of 300 square metres or more of indigenous vegetation, except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan, (b) in the Free State, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*														intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.		
		Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Heritage resources	• Loss or damage to sites, features or objects of cultural heritage significance	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E5)
		Paleontological Heritage	• Disturbance, damage or destruction of legally-protected fossil heritage* within the development footprint during the construction phase	-		S	P	U	IR	ML	Yes	N/A	L	Heritage Impact Assessment (Appendix E5)

Activity 14(ii)(c)(b)(i)(ff)(hh) (GN.R 324): *"The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within 10 kilometers from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA…."*															
OPERATIONAL PHASE															
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and*	The key components of the proposed project are described below:	BIOPHYSICAL ENVIRONMEN	Fauna & Flora	• Fauna and Flora		-	L	L	Po	PR	ML	Yes	- See Table 6.4	L	Ecological Impact Assessment (Appendix E1)

distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – a) temporarily required to allow for maintenance of existing infrastructure; b) 2 kilometres or shorter in length; c) within an existing transmission line servitude; and d) will be removed within 18 months of the commencement of development." 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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure."* Activity 10 (b)(hh) (GN.R 324): "*The development*	• PV Panel Array - To produce 20MW, the proposed facilities 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 mounted to a single access tracking frame system • 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 800V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 800V 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		Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance. • Collisions with PV panels leading to injury or loss of avian life. • Insignificant impacts expected to be associated with the power line as the line is proposed to be of a very short length.		-	S	L	Pr	PR	ML	Yes	- See Table 6.4	M	Avifaunal Impact Assessment (Appendix E2)
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Loss of agricultural potential (low significance relative to agricultural potential of the site).		-	L	L	D	PR	SL	Yes	- See Table 6.4	L	Agricultural and Soil Compliance Statement (Appendix E4)
			Geology	• Collapsible soil. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	L	Geotechnical Feasibility Assessment (Appendix E8)

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 Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."	power will be evacuated into the national grid via the proposed 132kV power line. It is expected that generation from the facility will connect to the national grid via a loop-in loop-out connection into the existing Kroonstad-Everest 132kV Power Line. The proposed connection point into the national grid is located within the Remaining Extent of Farm Vogelsrand No. 373. • Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~0.5-1m underground as far as practically possible. • Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site: ○ Office / Control Room (~300m²); ○ 22kV Switch gear and relay room (~200m²); ○ 22kV/132KV Outdoor Switchyard (5000m²); ○ Security control (~60m²) • Battery Energy Storage System – A Battery Storage Facility with BESS		Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils 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	-
			General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. • Generation of hazardous waste.		-	S	M	Pr	PR	ML	Yes	- See Table 6.4	L	-
			Surface water	• Degradation of Watercourse		-	L	L	Pr	PR	ML	Yes	- See Table 6.4	L	Ecological Impact

	Containerized solution and associated operational, safety and control infrastructure will be required. A maximum height of 4m and a maximum volume of 6400m^3 of batteries and associated operational, safety and control infrastructure is expected to be required. • Roads – Access will be obtained via the R70 regional road to the north of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Internal roads are expected to have a width of up to 4m. • 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 up to 2.5 meters will be used (will be of a Clearvu type fence).	SOCIAL/ECONOMIC	Visual landscape	• Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP. • Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP. • Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures. • Visual impacts and sense of place impacts associated with the operation phase of SPP.		-	L	L	D	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E3)
			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase.	-		L	L	Po	CR	NL	Yes	-	L	Traffic Impact Assessment (Appendix E7)
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

				during the operational phase.											
			Heritage resources	• Loss or damage to sites, features or objects of cultural heritage significance	-		S	S	U	PR	ML	Yes	- See Table 6.4	L	Heritage Impact Assessment (Appendix E5)
			Electricity supply	• Generation of additional electricity. The power line will transport generated electricity into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar Energy facility and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Improvement of habitat through revegetation / succession over time • Soil erosion and sedimentation. • Spreading and establishment of alien invasive species • Habitat degradation due to dust • Spillages of harmful substances • Road mortalities of fauna / impact of human activities on site.		-	S	L	Po	N/A	N/A	Yes	- See Table 6.5	L	Ecological Impact Assessment (Appendix E1)
			Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-

			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills).		-	S	S	Pr	PR	M	Yes	- See Table 6.3	L	Agricultural and Soil Compliance Statement (Appendix E4)
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in stormwater run-off. • Pollution of water sources due to soil erosion.		-	L	S	Pr	PR	ML	Yes	- Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater (or surface water) contamination.	M	-

			Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility. • The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E3)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	L	Traffic Impact Assessment (Appendix E7)
			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	- See Table 6.3	L	Social Impact Assessment (Appendix E7)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E7)
			Tourism industry	• Since there are no tourism facilities in close proximity	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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 Generic EMPr for the on-site facility IPP substation is included in Appendix F2.

The Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F3.

				to the site, the decommissioning activities will not have an impact on tourism in the area.											
			Heritage resources	• It is not foreseen that the decommissioning phase will impact on any heritage resources.	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E5)

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

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures need to be implemented for potential impacts associated with the proposed activity and development phases. The following key issues have been identified and are addressed in this Final EIA Report.

6.2.1 Impacts during the construction phase

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – a) temporarily required to allow for maintenance of existing infrastructure; b) 2 kilometres or shorter in length; c) within an existing transmission line servitude; and d) will be removed within 18 months of the commencement of development."*

- Activity 12(ii)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse, excluding – (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applied; (cc) activities listed in activity 14 in Listing Notice 2 od 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared."*

- 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 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes 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, excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes."*

- 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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure."

- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan."*

- Activity 10 (b)(i)(ee)(gg)(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 Free State, (i) outside urban areas,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, (gg) areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA… and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 12 (b)(i)(ii)(vi) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation, except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan, (b) in the Free State, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 14(ii)(c)(b)(i)(ff)(hh) (GN.R 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within 10 kilometers from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA…."*

During the construction phase temporary negative impacts are foreseen over the short term for the 20MW solar facility. Table 6.3 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase for the development.

Table 6.3: Impacts and the mitigation measures associated with the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecological Impact Assessment (Appendix E1)	Direct habitat destruction Site clearing and preparation	Negative Medium	Negative Low	• No development should be allowed in vegetation unit 1 (Seasonal Drainage Channel). The area should be fenced off prior to construction and zoned as a no-go area. • The entire area to be developed must be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. • To minimise the effect on the vegetation, insects, small mammals, and environment it is recommended that the construction be done within the winter period as far as possible, when most plants are dormant and animals less active. • Where vegetation of areas not to be developed needs to be "opened" to gain access it is recommended that the herbaceous species are cut short rather than removing them. • Vegetation clearance should be restricted to the approved development areas allowing remaining animals the opportunity to move away from the disturbance. The Environmental Control Officer (ECO) should recommend, and the ECO should monitor these areas. • Any disturbed or eroded areas within the PV sites should be appropriately revegetated. Only indigenous (to the area) grass species are recommended.

				• Storage of equipment, fuel and other materials should be limited to demarcated areas. They should be established at least 300 meters away from any no-go area or buffer zones previously mentioned. • No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. • A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen to rehabilitate areas that became degraded due to construction activities. • Alien invasive plants present within the various vegetation units must be removed and eradicated throughout all stages of the project. • All stormwater and runoff generated by the development activities must be appropriately managed. • Monitoring of all these activities must be done on a weekly basis by the ECO during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area. Any transgressing of rules must be reported to and by the ECO.
	Seasonal Drainage Channel Degradation	Negative High	Negative Low	• No development should be allowed in vegetation unit 1 (Seasonal Drainage Channel). The area should be fenced off prior to construction and zoned as a no-go area. • The drainage channel and appropriate buffer zones must be fenced off prior to construction and declared as a No-Go area. • Fences must not restrict the dispersal or exploratory movements of remaining faunal species. Palisade fencing

				with a minimum of 15cm gap is recommended along the seasonal Drainage Channel area. • The few alien vegetation individuals must be controlled. • Disturbed areas around the channel as well as the proposed buffer zones must be re-vegetated with an indigenous (to the area) grass seed mixture. • No hazardous materials should be stored within 300 m of the channel. • Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) and surface water in the area. • No cleaning of equipment should be done closer than 300m of the edge of the buffer zone. This includes the establishment of temporary and permanent offices and ablution facilities. • All vehicles and equipment should be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area at least 300m away from the edge of the watercourse buffer zone to prevent ingress of hydrocarbons into topsoil. • No dumping or storage of waste should take place within the watercourse areas. • Drainage must be controlled to ensure that runoff from the site will not culminate in off-site pollution or result in rill and gully erosion or any erosion of the watercourse. • Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage.

				• The release of storm water must be designed such that the force of the water is reduced to prevent unnecessary erosion. • No dumping of waste should take place within the watercourse areas. If any spills occur, they should be cleaned up immediately. • Adequate toilet facilities must be provided for all staff to prevent pollution of the environment.
	Loss of Fauna and Flora	Negative Medium	Negative Low	• All temporary stockpile areas, litter and dumped material and rubble must be removed and disposed of at a licensed land fill facility. Proof of safe disposal must be obtained and kept on record for monitoring purposes. • The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site. • Undeveloped areas that were degraded due to human activities must be rehabilitated using indigenous to the area vegetation. • Hazardous chemicals must be stored on an impervious surface accompanied by Safety Data Sheets (SDS) and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom. • Limit human activity in the no-development areas as well as the completed areas to the minimum required for ongoing operation.

				• Any alien plant observed should be reported to the environmental manager and should be removed as soon as possible. • Regular monitoring (monthly) for damage to the environment as well as establishment of alien plant species must be conducted.
Avifauna Impact Assessment (Appendix E2)	Displacement of priority avian species from important habitats	Negative Medium	Negative Low	• Limit the construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), lay-down areas must be placed only on disturbed zones, construct in shortest timeframe possible, control noise to minimum.
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	• Limit construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), lay-down areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, control noise to minimum.
	Loss of important avian habitats	Negative Medium	Negative Low	• Limit construction footprint, limit access to the remainder of the area, lay-down areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, use existing roads as far as possible, rehabilitate with indigenous vegetation.
Visual Impact Assessment (Appendix E3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Low	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction

				• Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities to between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Agricultural and Soils Compliance Statement (Appendix E4)	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	• No mitigation measures are proposed.
	Loss of agricultural potential by soil degradation	Negative Low	Negative Low	• Loss of topsoil can result from poor topsoil management during construction related excavations. Topsoil should be stored for later use. • Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of

				the soil to support vegetation growth. Spillage and contamination of soil should be avoided. • Due to the very low slope of the land, the site has a low susceptibility to soil degradation.
	Erosion	Negative Low	Negative Low	• Implement an effective system of storm water 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.
	Topsoil loss	Negative Low	Negative Low	• 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.
Heritage Impact Assessment (Appendix E5)	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	• No archaeology was documented within the footprint. • Should significant archaeological materials – such as well-preserved subsurface artefacts or fossils – be exposed during construction, the on-duty Environmental Control Officer should protect these (preferably in primary exposed context) and should immediately consult a professional archaeologist. In this circumstance, the South African Heritage Resources Authority should be immediately alerted so that appropriate mitigation measures by a professional archaeologist can be implemented, at the

				expense of the developer. In such a scenario, mitigation measures would normally involve the application for an excavation permit and the digital documentation of the occurrences with modern archaeological recording standards, as well as the collection of a reflective sample of material to be deposited in a local approved curation facility.
Palaeontological Impact Assessment (Appendix E5)	Disturbance, damage or destruction of legally-protected fossil heritage (Refers essentially to impacts on well-preserved and / or rare fossils of scientific and conservation value within the development footprint during the construction phase)	Negative Low	Negative Low	• There are no objections on palaeontological heritage grounds. Any fossil finds, most likely in the Adelaide Subgroup sediments and Quaternary Sands, are to be reported by the developer. Should important fossil material be found during excavations, the Fossil Finds Procedure must be implemented.
Social Impact Assessment (Appendix E6)	Creation of direct and indirect employment opportunities.	Positive Low	Positive Low	• 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 Matjhabeng LM, Lejweleputswa DM, Free State Province, South Africa, or elsewhere.

				• Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. • As with the labour force, suppliers should also as far as possible be sourced locally. • As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
	Economic multiplier effects from the use of local goods and services.	Positive Low	Positive Low	• It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. • Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
	Potential loss in productive farmland	Negative Low	Negative Low	• The proposed site for the Solar Facility needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area.

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

				• Implement, 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.
	Temporary increase in safety and security concerns associated with the influx of people	Negative Medium	Negative Low	• Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Provide transportation for workers to prevent loitering within or near the project site outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period. • The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. • Access in and out of the construction site should be strictly controlled by a security company appointed to the project.

				• A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. • The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. • The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	Impacts on daily living and movement patterns	Negative Low	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 and control measures along the R730, R70 and the Beatrix Shaft 4 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 impact (noise and dust)	Negative Low	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.

	Increased risk of potential veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. • The use of cooking or heating implements should only be used in designated areas. • Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.
	Impacts on the sense of place	Negative Low	Negative Low	• Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays.

				• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. • Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the site.
Traffic Impact Assessment (Appendix E7)	Traffic impacts relating to the construction phase of the DPT Henneman Solar Facility	Negative Medium	N/A	• All construction vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating; and • 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 site will serve as a solar energy facility. The potential impacts will take place over a period of 35 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is – a) temporarily required to allow for maintenance of existing infrastructure; b) 2 kilometres or shorter in length; c) within an existing transmission line servitude; and d) will be removed within 18 months of the commencement of development."*
- 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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure."*
- Activity 10 (b)(i)(ee)(gg)(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 Free State, (i) outside urban areas,(ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, (gg) areas within 10 kilometers from national parks or world heritage sites or 5 kilometers from any other protected area identified in terms of NEMPAA… and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 35-year period. Table 6.4 summarises the potentially most significant impacts and the mitigation measures that are proposed during the operational phase for the development.

Table 6.4: Impacts and the mitigation measures associated with the operation phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecological Impact Assessment (Appendix D1)	Fauna and Flora	Negative Medium	Negative Low	• All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded in an environmentally friendly way. • Undeveloped areas that were degraded due to human activities must be rehabilitated with indigenous vegetation. • Hazardous chemicals must be stored on an impervious surface and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom. • Palisade fencing with adequate gaps (>15cm) is recommended for the conserved private open space around the seasonally inundated seepage wetlands and seasonal stream on the site. • During the post-construction phase, artificial lighting must be restricted to security areas and not directed towards the conserved areas (Seasonal Drainage Channel) in order to minimize the potential negative effects of the lights on the natural nocturnal activities. • Regular monitoring must be undertaken to determine and degradation of the vegetation and or animal habitat.
	Surface water / watercourse	Negative Medium	Negative Low	• The release of storm water must be designed such that the force of the water is reduced to prevent unnecessary erosion.

				• No dumping of waste should take place within the channel area If any spills occur, they should be cleaned up immediately. • Remove all substances which can result in groundwater (or surface water) pollution.
Avifauna Impact Assessment (Appendix D2)	Displacement of priority avian species from important habitats	Negative Medium	Negative Low	• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds.
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds.
	Collisions with PV panels leading to injury or loss of avian life	Negative Medium	Negative Low	• Panels to be flat at night, preferably low sheen/matt surfaces, quarterly fatality monitoring.
Visual Impact Assessment (Appendix D3)	Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP.	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impact on observers travelling along the roads and residents at	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.

	homesteads within a 5-10km 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 impacts of lighting at night on visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	• Shield the source of light by physical barriers (walls, vegetation etc.). • Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. • Make use of minimum lumen or wattage in fixtures. • Make use of down-lighters, or shield fixtures. • Make use of low-pressure sodium lighting or other types of low impact lighting. • Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
	Glint and glare on sensitive visual receptors in close proximity to the proposed facility.	Negative Low	N/A	• No mitigation measures applicable.
	Visual impact of sensitive visual receptors located within a 500m radius of the proposed power line.	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. Operations • Maintain the general appearance of the servitude as a whole.

	Visual impact and impacts on sense of place	Negative 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.
Agricultural and Soils Compliance Statement (Appendix D4)	Enhanced agricultural potential through increased financial security for farming operations	Positive Low	Positive Low	• No enhancement measures are proposed.
	Dust impact	Negative Low	Negative Low	• Implement dust suppression during the construction phase.
	Erosion	Negative Low	Negative Low	• 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.
	Topsoil Loss	Negative Low	Negative Low	• 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.
Social Impact Assessment (Appendix D6)	Creation of employment opportunities and skills development	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• No mitigation measures are proposed.
	Loss of agricultural land and overall productivity	Negative Medium	Negative Low	• The proposed mitigation measures for the construction phase should have been implemented at this stage. • Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.
	Contribution to LED and social upliftment	Positive Medium	Positive High	• A Community Needs Analysis (CNA) must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. • Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. • The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the

				community at the time (bearing in mind that these are likely to change over time).
	Potential impacts related to the impact on tourism.	Low Positive	Low Positive	• Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a "Green Energy" awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. This could be implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which should be open to school fieldtrips, the local community, and tourists.
	Visual impact and impacts on sense of place	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.
General Environment (Risks associated with BESS development)	Mechanical breakdown / Exposure to high temperatures	Negative Medium	Negative Low	• 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.
	Fires, electrocutions and spillage of toxic substances into the surrounding environment.			

	Spillage of hazardous substances into the surrounding environment.			• Training records should be kept on file and be made available during audits. • Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. • Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the 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.
	Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas.			
	Water Pollution – spillages into surrounding watercourses as well as groundwater.			
	Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.			
	Generation of hazardous waste			

				• 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.

6.2.3 Impacts during the decommissioning phase

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

Table 6.5: Impacts and the mitigation measures associated with the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifauna Impact Assessment (Appendix E2)	Displacement of priority avian species from important habitats	Negative Low	Negative Low	• None required due to low significance
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	• None required due to low significance
Agricultural and Soils Compliance Statement (Appendix E4)	Erosion	Negative Low	Negative Low	• 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.
	Top Soil	Negative Low	Negative Low	• 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.
Social Impact Assessment (Appendix E6)	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.

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:

- Ecological Impact Assessment – Enviroguard Ecological Services (see Appendix E1)
- Avifaunal Impact Assessment – Agreenco Environmental (see Appendix E2)
- Visual Impact Assessment – Phala Environmental Consultants (see Appendix E3)
- Agricultural Compliance Statement - Johann Lanz Soil Scientist (Appendix E4)
- Heritage Impact Assessment – CTS Heritage (see Appendix E5)
- Social Impact Assessment – Phala Environmental Consultants (see Appendix E6)
- Traffic Impact Assessment – BVi Consulting Engineers (see Appendix E7)
- Geotechnical Feasibility Assessment - Rocksoil Consult (see Appendix E8)
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics, in conjunction with the project specialists (refer to Section 7 of this report).

The following sections summarise the main findings from the specialist reports in relation to the key issues and impacts identified to be associated with the proposed facilities. Furthermore, the section provides a sensitivity analysis which gives an indication of where specific sensitive environmental features or areas of sensitivity have been identified as part of the specialist assessments within the respective sites that need to be avoided by the placement of the development footprint.

6.3.1 Heritage (archaeological and palaeontological) 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 sites. 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. Consideration and assessment was given in terms of archaeology and palaeontology. . The main question which needs to be addressed is:

> *"Will the proposed development impact on any heritage, archaeological artefacts or palaeontology?"*

The Heritage Impact Assessment (Refer to Appendix E5) confirmed the following:

No heritage resources were identified during the field assessment.

Although the presence of Adelaide Subgroup would normally require a field scoping study be conducted before excavation takes place, the entire footprint of the proposed development has been modified for agricultural purposes and is covered by dense grasses. This makes it unlikely that a field scoping study would provide any more information on the likelihood of the project resulting in irreversible loss of the palaeontological heritage. Based on this, along with the presence of Quaternary superficial deposits covering half of the fossiliferous sediments (Beaufort Group), and the lack of fossils finds in the SAHRIS list of heritage resources within close proximity to the development, it is anticipated that the impact of the development will mainly be low to moderate.

There are no objections on palaeontological heritage grounds. Any fossil finds, most likely in the Adelaide Subgroup sediments and Quaternary Sands, are to be reported by the developer. Should important fossil material be found during excavations, the attached Fossil Finds Procedure must be implemented.

Based on the outcomes of this specialist study, it is not anticipated that the proposed development of the solar PV facility and its associated grid connection infrastructure will negatively impact on significant heritage resources.

Based on the above no objection to the facility has been made from a heritage perspective and no no-go areas or areas that need to be avoided by the placement of the development footprint has been identified.

6.3.2 Ecological and Wetland Impacts

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

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

The Ecological Impact Assessment (refer to Appendix E1) confirmed that the site comprises farmland of which the largest sections were cultivated and is currently used as planted pastures on which a rotational grazing system for cattle is implemented. The vegetation of the site has a good vegetation cover with little sign of erosion, but in terms of its species composition it is not representative of the pristine natural ecosystem and vegetation type that occurred in the area many years ago.

The Seasonal Drainage Channel (vegetation unit 1) located along the south-eastern and southern boundary of the site is natural and fulfils an important water channeling function during high rainfall events directing surface water towards the south-east. It does however, based on aerial images, seem as though the system further south-east outside the site is degraded due anthropogenic influences. This unit has a moderate species richness as well as

important ecosystem functions and are regarded as having a High ecological sensitivity. This feature has been avoided by the development footprint to ensure the avoidance of direct negative impacts. Refer to the environmental and sensitivity map included in Figure G3.

Vegetation units 2, 3 and 4 (Planted Pasture; *Themeda triandra* grassland; Degraded Area) have been ploughed in the past for agricultural purposes with unit 2 planted with pasture grass and unit 3 left to recover. Unit 4 is degraded due to anthropogenic influences. Although unit 3 has some resemblance to the Vaal-Vet Sandy Grassland vegetation type (Gh 10) it is only in terms of the dominant grass *Themeda triandra* with all the other characteristic species absent due to previous agricultural practices. Based on the results of this study, vegetation units 2 and 4 are regarded as being transformed with no resemblance to the original native vegetation, while vegetation unit 3 is degraded with little of the original native vegetation present. Units 2 and 4 are from a floral ecological perspective regarded as having a Low ecological sensitivity and unit 3 a Low-medium ecological sensitivity.

No threatened or protected species were found to be present on the site while the medicinal plants identified are not threatened and occur abundantly throughout the Province.

The few individuals of the declared alien invader species present must be controlled. Alien invader species are a cause for concern since these species are not only spreading into the adjacent vegetation units, but also spread their seeds via bird species that utilise their fruits.

Based on the site verification and detailed survey visit, the ecological impacts of the proposed development of the area as solar farms were assessed and is not thought that development of vegetation units 2, 3, & 4 would have a large negative impact on the environment provided that the mitigation measures as indicated in this report are incorporated into the management plan and adhered to. No development within vegetation unit 1 (watercourse) and its associated buffer zone is recommended.

According to the DFFE screening tool (Appendix B) the vegetation of the site has an overall low sensitivity. Overall, the terrestrial biodiversity regarded as high. Due to the past and current agricultural activities the only areas regarded as having a high terrestrial Biodiversity Importance is the water course (unit 1).

All the envisaged impacts identified were either Low or Negligible after mitigation. The surrounding areas are also used for the cultivation of crops as well as grazing and are similarly transformed. Only the Seasonal Drainage Channel (vegetation unit 1) has connectivity with similar areas further south-east and north and act as a potential dispersal or biological corridor for remaining faunal species. Suitable migratory fences must be erected adjacent to the conserved channel and buffer zone.

Based on the above, the specialist has indicated that the development will not have a long-terms negative effect on the environment subject to the implementation of the recommended mitigation measures.

6.3.3 Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in Free State 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 Impact Assessment (Appendix E2) the proposed development is situated in an area of moderate avifaunal diversity, and the site is in the Endangered Vaal-Vet Sandy Grassland ecosystem type. Much of the surrounding area has been impacted by pasture production and grazing practices. The resident avifauna is represented by relatively moderate species richness and abundance, for which the total transformation of habitat will generate impacts.

The total avifaunal dataset is limited. Due to the project being classified as Regime 1 (BLSA Birds and Renewable Energy Guideline, 2017) a winter assessment is not required from an authorisation perspective. However, should the project be authorised, then a winter assessment would be suggested to supplement the relatively poor SABAP2 dataset, and to act as a baseline from which to monitor going forward.

There are individual impacts that are relatively high, however most can be effectively mitigated through the controls prescribed. The overall mitigated impacts can result in the project having an overall Low-Negative impact rating on avifauna. As there is an existing power line that already traverses the property, which will be fed by the SPP, there are no additional power line impacts expected with the development. No areas of high avifaunal sensitivity or no-go areas have been identified for the site.

Despite some residual and cumulative impacts, there is no objection, from an avifaunal perspective, to the development. The overall impact of the project on avifauna can be effectively mitigated, should the controls prescribed be adequately followed, with sufficient monitoring of mitigation effectiveness.

6.3.4 Visual Impacts

Due to the extent of the proposed photovoltaic solar facility it is expected that the development 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 provide any significant visual absorption capacity"

The Visual Impact Assessment (refer to Appendix E3) concluded that the post mitigation impact is a "*Negative Low"* impact during the construction, decommissioning and operational phases for the site. 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 characterised by agricultural activities and Eskom electricity infrastructure in the area.

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

Due to the height of the power line (32m) and 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. A number of mitigation measures have however been proposed regardless of whether or not 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 agricultural activities. No buffer areas or areas to be avoided are applicable for this development.

Due to the height of the power line (32m) and 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. A number of mitigation measures have however been proposed regardless of whether or not 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.

Considering all positive factors of such a development including economic factors, social factors and sustainability factors, especially in a semi-arid country, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. PLEASE NOTE that the details of the power line should be submitted with the South African Civil Aviation Authority (SACAA).

The specialist recommends that the project be approved from a visual perspective.

6.3.5 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 a soil survey has been conducted. The main question which needs to be addressed is:

"How will the proposed developments impact on agricultural resources and the soil?"

The Agricultural Compliance Statement (Appendix E4) stated that the entire site was verified in this assessment as being of medium sensitivity for impacts on agricultural resources with a maximum land capability value of 7. Parts of the site are allocated high agricultural sensitivity

on the DFFE screening tool (Appendix B), because they were under crop production in the past. However, the high sensitivity was disputed because the lands have not been used for crop production for an extended period and so should no longer be classified as cropland or allocated high sensitivity because of it. The land was assessed as being of insufficient land capability for viable and sustainable future crop production. The cropping potential of the site is limited by the combination of fairly low rainfall and shallow soils limited by dense clay and poor drainage in the subsoil.

Two potential negative agricultural impacts were identified, loss of agricultural land use, and land degradation. Two positive agricultural impacts were identified as enhanced agricultural potential through increased financial security for farming operations, and improved security against stock theft and other crime. All of these are likely to have a low impact on future agricultural production potential and are therefore assessed as having low significance.

The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. Instead, the development represents the ideal, win-win situation for both agricultural production and for electricity generation in South Africa, where renewable energy facilities are integrated with agricultural production in a way that provides benefits to agriculture and leads to little loss of future agricultural production potential.

The impact of the proposed development on the agricultural production capability of the site is assessed as being acceptable because of the above factors. Therefore, from an agricultural impact point of view, it is recommended that the development be approved.

The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.

6.3.6 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 activities 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 E6). The main question which needs to be addressed is:

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

The findings of the Social Impact Assessment (Refer to Appendix E6) indicate that there are some vulnerable communities within the area that may be affected by the development. 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"..

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.

It should be noted that the perceived benefits associated with the project, which include renewable energy generation and local economic and social development, outweigh the perceived impacts associated with the project

The specialist concludes that the project, and its associated infrastructure, will be unlikely to result in permanent damaging negative social impacts, and therefore from a social perspective the project can be developed subject to the implementation of the recommended mitigation measures and management actions identified for the project.

6.3.7 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 sites*?"

According to the Traffic Impact Assessment (Appendix E7) the impact of the construction, operation and decommissioning trip generation, on the future background traffic volumes near the propose development and along transportation routes, are expected to be low.

All construction materials and solar modules will be transported via normal loads. Transformer and substation components will be transported via abnormal loads. The preferred access point to the site is situated off an unknown gravel road off the R70. The formalisation of this access point, to the standard, might be a requirement as part of the wayleave approval of the Free State Department: Police, Roads and Transport.

Furthermore, the assessment recommends that all internal roads considered should conform to the geometric and pavement design parameters as indicated on the design standard certificate, and adequate traffic accommodation signage must be erected and maintained on either side of the access, on the unknown gravel road, throughout the construction phase of the development. In addition, traffic accommodation signage should also be erected at affected major intersections on the transportation routes.

The specialist has indicated that the development of the 20MW solar facility within the affected property is supported from a traffic perspective.

6.3.8 Geotechnical Considerations

Large developments require input from a geotechnical perspective. The main question which needs to be addressed is:

> "*How will the proposed development be impacted from a geotechnical perspective should it be developed on the site*?"

The Geotechnical Feasibility Assessment (Appendix E8) has indicated that the presence of sandstone, mudstone (shale) and dolerite were confirmed during the site investigation. The soil profile horizons present on site are fairly undulating with depth. The centre to southern portions of the site is mainly covered with an upper topsoil, underlain by sand rich colluvial horizons with varying amounts of fines (silt and clay). The northern portion of the site is covered with an upper topsoil, locally underlain by a fines rich colluvium or gravel rich pebble marker.

No sandstone, shale or dolerite outcrop were encountered on-site. However, surficial dolerite rock boulders were encountered to the northern portion of the site. The intrusive (dolerite) geological setting is however well known for its spheroidal weathering resulting in small to large sized corestones. The potential presence of corestones cannot be out ruled.

The site is currently mainly undeveloped. The geotechnical character is of such that it is deemed suitable for the proposed land-usage (solar facility), provided that the geotechnical constraints are considered and incorporated into the planning and design.

The following main conclusions have been provided:

- The site is generally undeveloped.
- The site is not underlain by potential soluble dolomitic formations and a dolomite stability investigation is not required.
- Potential economic deposits are not expected to affect the developability of this site.
- The presence of expansive/collapsible soils will require earthwork and foundation precautionary measures for masonry structures. The conditions should be confirmed, with site class designations, precautionary measures and recommendations to be provided in the detailed investigation report to follow.
- Localised excavation difficulty down to 1.5 mbngl is expected on site to the northern site portion.
- No geotechnical hazards that may impact on the developability of the site were identified.
- No geotechnical fatal flaws were identified.
- A number of geotechnical constraints were identified as discussed in the relevant report sections.
- Basic erosion control measures will be required, especially when vegetation is removed, and the soil is exposed. Details on control measures should be provided in the more detailed assessments to follow.

The site is deemed suitable for the proposed development, as from a geotechnical perspective, provided the identified constraints are considered and incorporated into the planning and design.

6.3.9 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 facilities 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 solar facility the location of the BESS within the development footprint 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 EMPrs (Appendix F1) to reduce the risk of an incident and manage an incident should one ever occur.

6.4 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activities. 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 6.6.

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.

6.4.1 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 6.6: Impact 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 requirements of Section 2 of the NEMA to consider cumulative impacts as part of any environmental assessment process.

7.1 Introduction

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

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

Despite these challenges, cumulative impacts have been afforded increased attention in this Final EIR and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact – refer to Appendix E. This chapter analyses the 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 proposed Project itself, and the overall effects on the ecosystem of the respective project area that can be attributed to the project and other existing and planned future projects.

7.2 Geographic Area of Evaluation

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

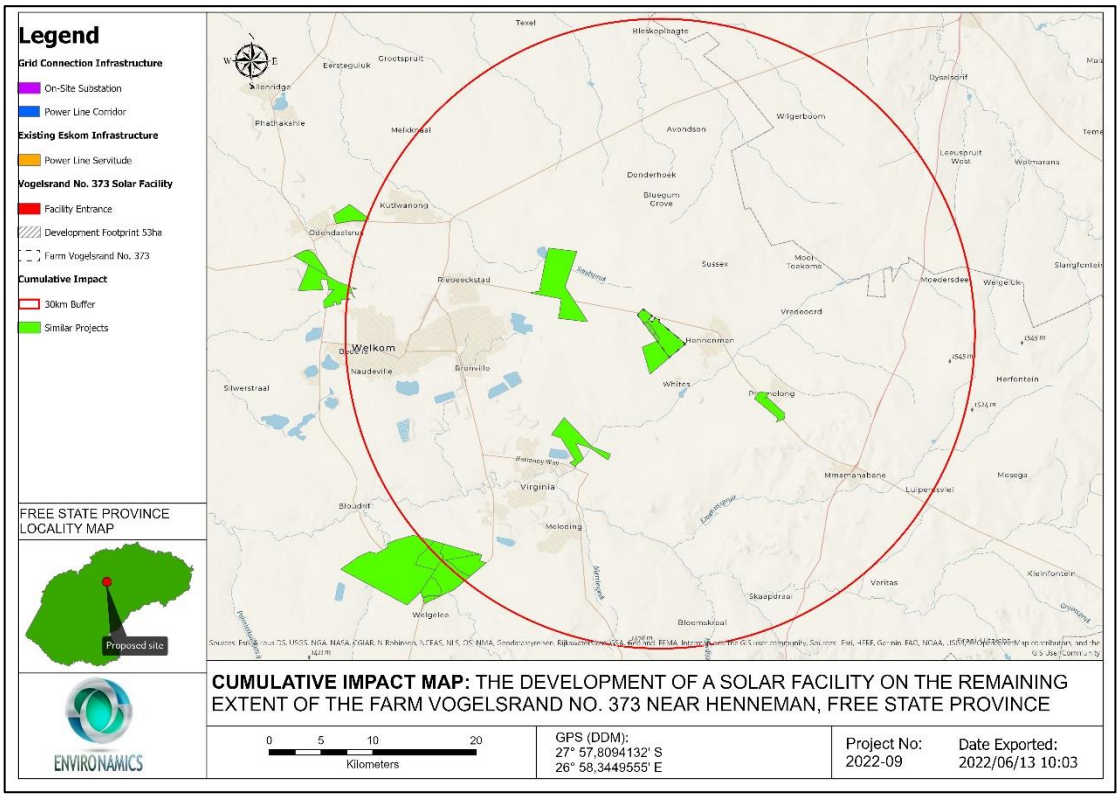


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Free State 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 these cumulative effects analysis are the anticipated lifespan of the proposed project extending out at least 20 years once constructed, 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 and proposed projects in the geographical area of evaluation.

7.4.1 Existing projects in the area

According to the DFFE's database and local knowledge from the Applicant, thirteen (13) solar PV plant applications have been submitted to the Department within the geographic area of investigation – refer to table 7.1.

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

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Korhaan Creek Project no.2	27km	-	14/12/16/3/3/2/543	Scoping and EIA	Withdrawn/Lapsed
Beatrix Mine Shaft 4, Oryx Mine PV	25km	19MW	12/12/20/2669	BAR	Approved
Onverwag and Vaalkranz PV 1	9km	75MW	14/12/13/3/3/2/580	Scoping and EIA	In process
Hennenman 5 mw	8km	5MW	14/12/16/3/3/1/1322	BAR	Approved
Vogel's Rand 373	0km	10MW	14/12/16/3/3/1/534	BAR	Withdrawn/Lapsed
Kalkoenkrans solar plant	29km	-	14/12/16/3/3/2/433	Scoping and EIA	Withdrawn/Lapsed

Korhaan Creek Solar plant	17km	-	14/12/16/3/3/2/434	Scoping and EIA	Withdrawn/Lapsed
Doornriver Solar plant	28 km	-	14/12/16/3/3/2/436	Scoping and EIA	Withdrawn/Lapsed
Everest solar	0 km	75MW	14/12/16/3/3/2/512	Scoping and EIA	In process
Uitkyk, Helderwater and Doornpan	5km	75MW	14/12/16/3/3/2/581	Scoping and EIA	In process
Harmony Tshepong solar	30km	10MW	14/12/16/3/3/1/1444	BAR	Approved
Harmony Eland solar	30km	10MW	14/12/16/3/3/1/1471	BAR	Approved
Harmony Nyala solar	30km	10MW	14/12/16/3/3/1/1472	BAR	Approved

From the thirteen developments identified, five no longer have a valid Environmental Authorisation, and therefore only eight of the listed projects have the potential to be developed and essentially contribute to a cumulative impact to the area (i.e. 30km radius). As per Figure 7.1, only one development (Everest Solar) is located in close proximity to the site under assessment for the development, with the remaining facilities located 5km or more from the site under assessment.

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

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

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

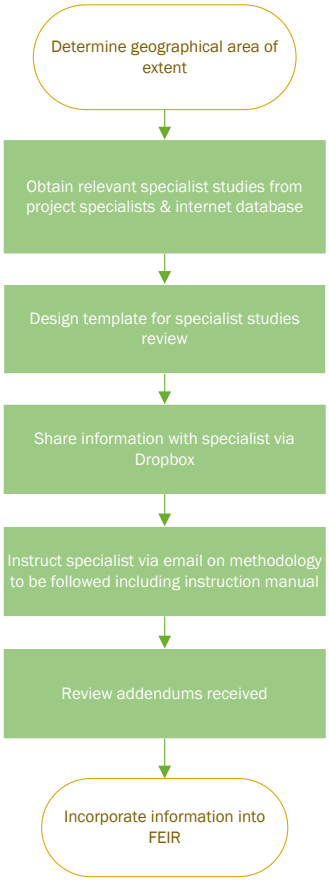


Figure 7.2: Process flow diagram for determining cumulative effects

The terms of reference of each specialist study is included in the respective specialists reports as included as Appendix E.

7.5.1 Soil, Land Capability and Agricultural Potential

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

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the

development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

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

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

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

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

In quantifying the cumulative impact, the area of land taken out of agricultural production (grazing) as a result of all 12 developments (total generation capacity of 562 MW) will amount to a total of approximately 1,405 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to only 0.50% of the surface area. That is within an acceptable limit in terms of loss of land which is only suitable for grazing, of which there is no particular scarcity in the country.

The proposed development poses a low risk in terms of causing soil degradation because it can be fairly easily and effectively prevented by standard best practice soil degradation control measures. If the risk for each individual development is low, then the cumulative risk is also low.

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

7.5.2 Ecology and Wetlands

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

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

- The cumulative impact on the natural ecosystems (fauna and flora) would be low considering that large sections of the area for development has already been degraded through agricultural activities (crop cultivation, overgrazing etc.).
- The low cumulative impacts are however dependant on the strict implementation of mitigation measures and monitoring during the construction, operational and decommissioning phases of the solar developments.

7.5.3 Avifauna

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

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

Implementing successful mitigations would reduce the cumulative impacts of displacement of priority species by 32% to Medium-Negative, would reduce the cumulative impacts of

displacement of resident avifauna by 24% to an acceptable Low-Negative score, and would reduce the cumulative impacts of loss of important avian habitats by 28% to Medium-Negative.

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

7.5.4 Social Impact Assessment

The Social Impact Assessment (refer to Appendix E6) indicate that from a social impact point of view the project represents an important development opportunity for the communities surrounding the project. Should it be approved, it will not only supply the national grid with much needed clean power, but will also provide a number of opportunities for social upliftment. The cumulative impacts for each of the potential social impacts were assessed throughout the report.

The most significant cumulative social impacts are both positive and negative: the community will have an opportunity to better their social and economic well-being, since they will have the opportunity to upgrade and improve skills levels in the area, but impacts on family and community relations may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

No social cumulative impacts with an unacceptable impact significance are expected to occur.

7.5.5 Visual

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

7.5.6 Heritage

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

For the project area, the impacts to heritage sites are expected to be of low significance. At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. Although this project falls outside of a REDZ area, it is noted that it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

7.5.7 Traffic

According to the Traffic Impact Assessment (refer to Appendix E7) depending on the timing of the other nearby renewable energy projects, where construction in particular could overlap, traffic impacts 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 proposed 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

A summary of the cumulative effects discussed are summarized in Table 7.2. There have been specific VECs identified with reference to the Solar Energy Facility (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 associated with the proposed development

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Ecological Impact Assessment	Habitat destruction Site clearing and preparation	The construction phase of the development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- Low
	Seasonal Drainage Channel degradation	The construction activities associated with the proposed solar power plant will potentially have an impact on the wetland areas and water levels, whether it is through direct or indirect impacts. The clearance of vegetation for the solar power plant will either have a direct or indirect impact on the wetlands and smaller drainage channels. Loss of the riparian and instream habitat will also result in permanent loss or displacement of the invertebrates, birds and small mammals' dependant on the wetland vegetation for feeding, shelter and breeding purposes. All functions associated with the wetland zones and the surrounding landscape will be compromised if mitigation measures are not applied correctly. Other indirect impacts of the construction of the solar power plant on the characteristics of the water course include impacts on water quality and changes to the geomorphology should the development cause impacts on downstream areas. The impact is considered to be cumulative due to proposed development impacting on the characteristics of the watercourse.	- Low
	Loss of Fauna and Flora	The construction phase of the development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- Low

Avifaunal Impact Assessment	Displacement of priority avian species from important habitats	The displacement of priority 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 and Soils 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	Loss or damage to sites, features or objects of cultural heritage significance	The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For the purpose of this review, heritage sites located in urban areas have been excluded. Because of the low likelihood of finding further significant heritage resources in the relevant area proposed for development and the generally low density of sites in the wider landscape the cumulative impacts to the heritage are expected to be of low significance.	- Low

Palaeontological Impact Assessment	Disturbance, damage or destruction of legally-protected fossil heritage within the development footprints during the construction phase (impacts on well-preserved and / or rare fossils of scientific and conservation value)	A moderate to low palaeontological significance has been allocated to the proposed development. It is therefore considered that the development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	DPT Henneman PV project 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 the project alone.	+ Medium
	Impact with large-scale in-migration of people	While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.	- Medium

Traffic Impact Study	Increase in construction vehicles	The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e. the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.	- Low
		Operational Phase	
Ecological Impact Assessment	Habitat destruction Loss of fauna and Flora	The construction phase of the development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas.	- Low
	Seasonal Drainage Channel degradation	The construction activities associated with the proposed solar power plant will potentially have an impact on the wetland areas and water levels, whether it is through direct or indirect impacts. The clearance of vegetation for the solar power plant will either have a direct or indirect impact on the wetlands and smaller drainage channels. Loss of the riparian and instream habitat will also result in permanent loss or displacement of the invertebrates, birds and small mammals' dependant on the wetland vegetation for feeding, shelter and breeding purposes. All functions associated with the wetland zones and the surrounding landscape will be compromised if mitigation measures are not applied correctly. Other indirect impacts of the construction of the solar power plant on the characteristics of the water course include impacts on water quality and changes to the geomorphology should the development cause impacts on downstream areas. The impact is considered to be cumulative due to proposed development impacting on the characteristics of the watercourse.	- Low

Visual Impact Assessme	Visual intrusion of the development on observers within the area	The operation and maintenance of the facility will create visual instruction on observers that utilise and travel through the area, including travellers using the local roads.	- Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium

7.7 CONCLUSION

This chapter of the Final EIA 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.

The potential most significant cumulative impacts for the proposed development relate to:

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

The cumulative impact for the proposed developments is medium to low and no high, unacceptable impacts related to the project are expected. Considering the extent of the project (i.e. 53ha) and information presented in section 7 of this report, it can be concluded that the cumulative impacts of the 20MW solar facility will not result in large scale changes and impacts on the environment, and therefore it is appropriate for the developments to proceed within the geographic area of evaluation.

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 Free State Province. No cumulative impacts with a high residual risk have been identified.

In terms of the desirability of the development, it may be preferable to incur a higher cumulative loss in such a region as this one (where the landscape is not considered to be of a high value), than to lose land with a higher environmental value elsewhere in the country.

Therefore, considering the cumulative impact assessment it is confirmed that the development is appropriate from and environmental and social perspective and can therefore proceed in this regard.

8 ENVIRONMENTAL IMPACT STATEMENT

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

Appendix 3. (3) An EIR (...) 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, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(p) 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 EIA report:

- Impacts during construction phase:
  - Site clearing and preparation (including habitat destruction) (- Low)
  - Seasonal drainage channel degradation (- Low)
  - Loss of fauna and flora (- Low)
  - Displacement of priority avian species from important habitats (- Low)
  - Displacement of resident avifauna through increased disturbance (- Low)
  - Loss of important avian habitats (- Low)
  - Visual impact of construction activities on sensitive visual receptors in close proximity (- Low)
  - Loss of agricultural potential by occupation of land (- Low)

- Loss of agricultural potential by soil degradation (- Low)
- Erosion and topsoil loss(- Low)
- Loss or damage to sites, features or objects of cultural heritage significance (- Low)
- Disturbance, damage or destruction of legally-protected fossil heritage (- Low)
- Creation of direct and indirect employment opportunities (+ Low)
- Economic multiplier effects from the use of local goods and services (+ Low)
- Potential loss of productive farmland (- Low)
- In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure (- Low)
- Temporary increase in safety and security concerns associated with the influx of people (- Low)
- Impacts on daily living and movement patterns (- Low)
- Nuisance impact (noise and dust) (- Low)
- Increased risk of potential veld fires (- Low)
- Impacts on the sense of place (- Low)
- Traffic impacts relating to the construction phase (- Medium)

➢ Impacts during the operational phase:

- Loss of fauna and flora and impacts to surface water features (- Low)
- Displacement of priority and resident avifauna species (- Low)
- Collisions and electrocutions of avifauna (- Low)
- Visual impact on observers travelling on roads (- Low)
- Visual impact of lighting (- Low)
- Glint and glare impact (- Low)
- Impact on sense of place (- Low)
- Enhanced agricultural potential through increased financial security for farming operations (+ Low)
- Dust, erosion and topsoil loss (- Low)
- Creation of employment opportunities and skills development. (+ Medium)
- Development of non-polluting, renewable energy infrastructure. (+ Medium)
- Loss of agricultural land and overall productivity (- Low)
- Contribution to LED and social upliftment (+ High)

- Potential impacts related to the impact on tourism (+ Low)
- Impact on the sense of place (- Low)
- Risks associated with BESS development(- Low)

- Impacts during the decommissioning phase:
  - Displacement of priority avian species from important habitats (- Low)
  - Displacement of resident avifauna through increased disturbance (- Low)
  - Erosion and topsoil loss (- Low)
  - Loss of employment opportunities (- Low)
- Cumulative impacts resulting from similar development in close proximity to the proposed activity (-Low / - Medium)

Cumulative l impacts resulting from similar development in close proximity to the proposed activities are expected to occur, however the cumulative impact assessment included in Section 7 of this report has indicated that all cumulative impacts will be of a medium or low significance, with no impacts expected to be of a high and unacceptable significance.

No fatal flaws or impacts of a high significance has been identified to be associated with the proposed development.

8.2 SENSITIVITY ANALYSIS AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the layouts of the 20MW solar facility 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 Figures G3 and I for the final layout map which avoids the areas required to be conserved.

The majority of the site under assessment (i.e. the broader area of 70ha) has been classified as being either of a low or medium sensitivity. Only one surface water feature has been identified as being of a high sensitivity, which is related to the presence of a seasonal drainage channel located along the southern boundary of the site.

The Applicant has placed the development footprint (i.e. 53ha) within the larger site in consideration of the highly sensitive surface water feature to ensure avoidance of the sensitive feature and the associated recommended buffers which has resulted in an environmentally appropriate development footprint for the development.

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 F.

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

The details provided below are the details being requested to be authorised as part of the Application for Environmental Authorisation:

- PV Panel Array - To produce 20MW, the proposed facilities 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 mounted to a single access tracking frame system.
- 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 800V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required (22/132kV). Output voltage from the inverter is 800V 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 132kV power line. It is expected that generation from the facility will connect to the national grid via a loop-in loop-out connection into the existing Kroonstad-Everest 132kV Power Line. The proposed connection point into the national grid is located within the Remaining Extent of Farm Vogelsrand No. 373.
- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~0.5m-1m underground as far as practically possible.
- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:
    - Office / Control Room (~300m²);
    - 22kV Switch gear and relay room (~200m²);
    - 22kV/132KV Outdoor Switchyard (5000m^2);
    - Security control (~60m²)
- Battery Energy Storage System – A Battery Storage Facility with BESS Containerized solution and associated operational, safety and control infrastructure will be required. A maximum height of 4m and a maximum volume of 6400m^3 of batteries and associated operational, safety and control infrastructure is expected to be required.
- Roads – Access will be obtained via the R70 regional road to the north of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Internal roads are expected to have a width of up to 4m.
- 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 up to 2.5 meters will be used (will be of a Clearvu type fence).

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 this Final EIA report. In terms of the legal requirements, it is concluded that:

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 EIA Regulations (as amended in 2017) – already approved by the environmental authority.
- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017).
- The EIA process has been conducted as required by the EIA Regulations (as amended in 2017), Regulations 23 and Appendix 3.
- The EMPrs have been compiled in accordance with Appendix 4 of the EIA Regulations (as amended in 2017).
- The proposed mitigation measures will be sufficient to mitigate the identified impacts associated with the development to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and therefore, no terms of reference are provided for such studies.
- The optimised facility development footprint (Figure I) are considered to be appropriate for development from an environmental perspective based on the avoidance of sensitive environmental features and areas, and the associated buffer areas.

In terms of the contents and substance of the EIA report the EAP is confident that all key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP for the 20MW Solar Facility near Hennenman is that:

It is the opinion of the independent EAP that the proposed 20MW Solar Facility near Hennenman will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures and avoidance of certain areas within the site as recommended by the specialists. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the 20MW Solar Facility near Hennenman and associated infrastructure on the Remaining Extent of Farm

Vogelsrand No. 373, Registration Division Ventersburg, situated within the Matjhabeng Local Municipality area of jurisdiction, Free State Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPrs (Appendix F).
- 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 EMPrs should not be neglected and a copy of the EMPrs should be made available on site at all times.
- 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.
- Due to the project being classified as Regime 1 (BLSA Birds and Renewable Energy Guideline, 2017) a winter assessment is not required from an authorisation perspective. However, should the project be authorised, then a winter assessment would be suggested to supplement the relatively poor SABAP2 dataset, and to act as a baseline from which to monitor going forward.
- The period for which the Environmental Authorisation is required is 10 years. This is based on the fact that the project is intended to be bid as part of the DMRE REIPPP Programme, with there being uncertainty regarding the announcement of the next bidding rounds, and the need for a valid Environmental Authorisation. It must however be noted that the project may also participate in other programs/opportunities to generate power in South Africa, as available.

We trust that the department finds the report in order and await your comments in this regard.

Mrs. Lisa de Lange (Opperman)
Environamics Environmental Consultants

ENVIRONAMICS

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