AMENDED DRAFT BASIC ASSESSMENT REPORT

THE PROPOSED MOOIWATER SOLAR PV1 NEAR VILJOENSKROON, FREE STATE PROVINCE

24 October 2023

PROJECT DETAILS

DFFE Reference No.	:	14/12/16/3/3/1/2832
Project Title	:	Proposed Mooiwater Solar PV1 near Viljoenskroon, Free State Province
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Reviewed	:	Mr. Herman Alberts
Client	:	Mooiwater Solar PV1 (Pty) Ltd
Report Status	:	Amended Draft Basic Assessment Report
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GLOSSARY OF TERMS AND ACRONYMS

AC	Alternating Current
BA	Basic Assessment
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
BOS	Balance of System
CBA	Critical Biodiversity Area
CEA	Cumulative Effects Assessment
CR	Critically Endangered
DAFF	Department of Agriculture, Forestry and Fisheries
DC	Direct Current
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 Practiti1r
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
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.
GHG	Greenhouse Gas
GNR	Government Notice Regulation
HGM	Hydrogeomorphic
I&AP	Interested and affected party

IAP	Invasive Alien Plant
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilo Volt
LC	Least Concern
LCOE	Lowest Levelized Cost of Energy
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NEM:BA	National Environment Management Biodiversity Act
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystem Priority Areas
NT	Near Threatened
NWA	National Water Act No. 36 of 1998
O&M	Operational & Maintenance
OHPL	Overhead Powerline
PROJECT AREA	Project area of influence
POSA	Plants of South Africa
PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SCC	Species of Conservation Concern
SDF	Spatial Development Framework

SEI	Site Ecological Importance
SPP	Solar Power Plant
VN	Vulnerable
VU	Vegetation Unit

CONTEXT OF 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 1 of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

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

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

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. During the recent 2023 State of the Nation Address, the government has embarked upon allowing private developers to generate electricity. There are now more than 100 projects, which are expected to provide over 9 000 MW of new capacity over

time. A number of companies that have participated in the renewable energy programme will soon enter construction and deliver a total of 2 800 MW of new capacity. Through the Just Energy Transition Investment Plan, R1.5 trillion will be invested in our economy over the next five years in new frontiers such as renewable energy, green hydrogen and electric vehicles. A number of projects are already underway, including the development of a new facility by Sasol at Boegoebaai in the Northern Cape, the Prieska Power Reserve in the Free State, and the Hydrogen Valley initiative in Limpopo, Gauteng and KwaZulu-Natal.

In response to the above, Mooiwater Solar PV1 (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure (including grid connection infrastructure) for the purpose of commercial electricity generation on the Remaining Extent of the Farm Mooiwater No. 408 in the Free State Province situated within the Moqhaka Local Municipality area of jurisdiction (refer to Figure A for the locality map). The project entails the generation of up to 150MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will be up to 317.6 hectares (including supporting infrastructure) identified and assessed as part of the Basic Assessment (BA) process. The proposed grid connection and corridor will be assessed in a separate Basic Assessment.

A comprehensive regional site selection took place to identify the preferred site. This region is preferred for solar energy development due to its global horizontal irradiation value of around 2068 kwh/m2. The region is also preferred based on its inclusion within the Klerksdorp Renewable Energy Development Zone (REDZ) 10.

It was deemed necessary by the Department of Forestry, Fisheries and the Environment (DFFE) that an amended Draft Basic Assessment be subjected to a thirty (30) day public participation process in response to the fact that additional impacts, mitigation measures and layout amendments to further avoid environmentally sensitive features found on site have been identified as part of the Basic Assessment (BA) process. This additional information is included in this Amended Draft Basic Assessment.

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Moqhaka Local Municipality, within which the Mooiwater Solar PV1 is proposed, faces a number of challenges in addressing the needs and improving the lives of the community. The Final Integrated Development Plan (2022-2027) of the Fezile Dabi District Municipality[1] states that it is the vision of the municipality to improve the lives of their citizens and progressively meet their economic, basic and social needs thereby restoring community confidence and trust in government. The municipality aims to achieve their key strategic goals, such as delivering quality basic services (i.e. electricity, water and sanitation) to their communities, stimulating local economic growth and to ensure sound financial management and viability within the municipality. The Moqhaka Local Municipality's Final Integrated Development Plan (2022-2027) indicates the specific key performance areas and priority areas of the municipality which include basic service delivery, good governance, local economic development and social and community development to name a few. The development of the Mooiwater Solar PV1 will contribute to the goals of the respective local and district municipalities that will be affected by the proposed development, albeit to a limited extent.

Mooiwater Solar PV1 (Pty) Ltd intends to develop a 150MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of the Farm Mooiwater No. 408, situated within the Moqhaka Local Municipality area of jurisdiction. The town of Viljoenskroon is located approximately ~16km southeast of the proposed development (refer to Figure A and B for the locality and regional map). The development total footprint of the project will approximately be up to 317,6 hectares (including supporting infrastructure on site) within 466 hectares assessed as part of the full Basic Assessment process. The site[2] was identified as being highly desirable due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., low agricultural potential, ecological sensitivity and archaeology), proximity to the R76 and Vermaasdrift road which form part of the main access routes (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction and operation phase).

Grid connection infrastructure is also being proposed and will be assessed in a separate Basic Assessment, which includes internal power lines as well as a main grid connection to connect the facility to the national grid. The grid connection infrastructure includes a 132kV power line to connect the facility from a collector substation to the national grid by connecting into the existing 132/400kV Mercury Main Transmission Substation (MTS).

It should be noted that the grid connection infrastructure will be assessed as part of a separate Basic Assessment process.

[1] The Moqhaka Local Municipality falls within the Fezile Dabi District Municipality.

[2] The site is defined as the Remaining Extent of the Farm Mooiwater No. 408. The full extent of the site has been assessed as part of this BA process for the development by the EAP and the independent specialists.

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 Mooiwater Solar PV1 project. The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- LN1- Activity 14 (GN.R 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."*

- LN1- Activity 19(i) (GN.R 327): *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (i) a watercourse."*

- LN1 - Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*

- LN1 - Activity 28 (ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*

- LN1 - Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*

- L2- 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."*

- LN 2-Activity 15 (GN.R 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*

- LN3 - Activity 4 (b)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) Free State, (i) Outside urban areas, and (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional."*

- LN3 - Activity 10 (b)(i)(ee) (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) 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."*

- LN3 - Activity 12 (b)(i)(ii)(iv) (GN.R 324): "*The clearance of an area of 300 square metres or more of indigenous vegetation (b) 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 2004, (ii) Within critical biodiversity areas identified in bioregional plans (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- LN3 - Activity 18 (b)(i)(ee)(hh) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) 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."*

Activities required for the development of the solar PV facility which are listed under Listing Notice 1,2 and 3 (GNR 324-327 as amended 2017) implies that the development could potentially have a significant impact on the environment that will require mitigation. The proposed Mooiwater Solar PV1 Project is located within a Renewable Energy Development Zone (REDZ), specifically the Klerksdorp REDz. Therefore, the process to be followed will be as per GNR 114, as gazetted on 16 February 2018and subsequently a Basic Assessment process is required as described in Regulations 19 and 20 of the EIA Regulations (as amended). Solis-Environmental has been appointed as the independent Environmental Assessment Practitioner to undertake the Basic Assessment (BA) on behalf of Mooiwater Solar PV1 (Pty) Ltd.

Regulation 19 of the EIA Regulations (2017) requires that a Basic Assessment Report (BAR) must contain the information set out in Appendix 1 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 1 of GNR327-324 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the BAR. It has been determined through the BA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarized below.

Predicted 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 up to 24 months. The potentially most significant impacts relate to impacts on fauna and flora including the destruction, loss and fragmentation of habitats, ecosystems and the vegetation community, introduction of Invasive Alien Plant (IAP) species and invasive fauna,

destruction of protected plant species, and displacement of the indigenous faunal community, direct disturbance / degradation / minimal loss to already degraded depression and seep wetlands on site, soils or vegetation and increased erosion and sedimentation, visual impact of construction activities on sensitive visual receptors in close proximity to the Solar PV facility, loss or damage to sites, features or objects of cultural heritage significance (burial sites and homestead site located on site), destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study. Socio-economic impacts relate to the including creation of direct and indirect employment opportunities, influx of jobseekers and change in population in the study area, temporary increase in safety and security concerns associated with the influx of people, temporary increase in traffic disruptions and movement patterns, nuisance impact (noise and dust) and increased risk of potential veld fires.

Predicted impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 30 years. The negative impacts are generally associated with impacts on fauna and flora include continued fragmentation and degradation of natural habitats and ecosystems, continuing spread of IAP and weed species and ongoing displacement and direct mortalities of the faunal community, potential for increased stormwater runoff leading to Increased erosion and sedimentation and potential for increased contaminants entering the wetland systems, and soil erosion and compaction effects. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure, contribution to Local Economic Development (LED) and social upliftment and increase in household earnings.

Predicted impacts during the decommissioning phase:

The negative impacts generally associated with the decommissioning phase include habitat destruction caused by clearance of vegetation and the loss of permanent employment. However, skilled staff will be eminently employable, and several temporary jobs will also be created in the process. It is not expected that the facility will be decommissi1d, 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 (DFFE) database, there are approximately sixteen (16) similar developments that have been proposed near the proposed activity.

The potential for cumulative impacts therefore exists. The draft Basic Assessment report includes an assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to habitat destruction and fragmentation, displacement of priority avian species from important habitats, loss of important avian habitats, impacts of employment opportunities, business

opportunities and skills development and impact associated with large-scale in-migration of people. Cumulative impacts during the operational phase relate to habitat destruction and fragmentation and visual intrusion. The cumulative effect of the generation of waste was identified as being potentially significant during the decommissioning phase.

In accordance with the EIA Regulations, this final BAR evaluates and rates each identified potential impact and identifies and recommends mitigation measures which will be required in order to ensure the reduction of the impact significance of negative impacts to acceptable levels and the avoidance of negative residual risks. This final BAR also contains information that is required by the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) to consider the Application for Environmental Authorisation and to reach a decision as contemplated in Regulation 20 of GNR 326.

No fatal flaws or impacts with unacceptable levels of significance were identified and the impacts from the proposed development are expected to be at an acceptable level with the implementation of mitigation measures and therefore the project can be authorised subject to the implementation of the recommended mitigation measures.

1 INTRODUCTION

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

Appendix 1. (3) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-
(a) details of:

(i) the EAP who prepared the report; and

(ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

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

The Listing Notices 1,2 and 3 (GNR 324-327 as amended 2017) outline the activities that may be triggered and therefore require EA. This implies that the development is considered as potentially having a significant impact on the environment. A detailed description of the listed activities that are triggered are included in chapter 2 to follow. According to Appendix 1 of Regulation 326 the objective of the scoping process is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine-

- The nature, significance, consequence, extent, duration and probability of the impacts occurring; and
- degree to which these impact-
    - can be reversed;
    - may cause irreplaceable loss of resources, and
    - can be avoided, managed or mitigated; and

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

This draft Basic Assessment report has been submitted to the DFFE for review and comment. According to Regulation 326 all registered I&APs and relevant State Departments (including Organs of State) must be allowed the opportunity to review and provide comment on the draft Basic Assessment report. The Draft Basic Assessment Report was made available to I&APs and all relevant State Departments. They were requested to provide written comments on the report within 30 days of receiving it. This commenting period was conducted between 01 September and 03 October 2023. All issues identified and comments received during the review period were documented and compiled into a Comments and Response Report included as part of this Amended Draft Basic Assessment report. Where comments have been received prior to the release of the draft Basic Assessment report for the 30-day review and comment period, these comments are also included in Appendix C5 and C6 and responded to in the Comments and Responses Report (Appendix C7). These comments have been submitted as part of this Amended Draft Basic Assessment to the DFFE for decision making.

The previous Draft Basic Assessment Report was made available to the public for review during the period of 01 September to 03 October 2023. The DFFE indicated in an email dated xxx (refer to Appendix C5 for proof of correspondence) that an Amended Draft BAR be made available for public comment for another period of 30 days.

This stems from additional impacts and mitigation measures that have been identified through the BA process. These additional impacts and mitigation measures are included in this amended Draft BAR and the amended EMPr (refer to Appendix F1 and F2) in accordance with Regulation 19(1)(b) of the NEMA EIA Regulations, 2014, as amended. Subsequently this Amended Draft BAR has been made available for public comment from 20 October to 20 November 2023.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

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

And/or

Contact person:	Ms. Ayabulela Manjezi
EAPASA Registration:	2019/1279
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	063 443 1696 (Cell)
Electronic Mail:	aya@Solis-Environmental.co.za

And/or

Contact person:	Ms. Mary-Jane Khanyile
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	060 953 7164 (Cell)
Electronic Mail:	mary-jane@Solis-Environmental.co.za

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

1.3 DETAILS OF SPECIALISTS

Table 1.1 provides information on the specialists that have been appointed as part of the BA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent

status of the specialists, their declarations are attached as Appendix E to this report. The expertise of the specialists is also summarized in their respective reports.

Table 1.1: Details of specialists

Study	Prepared by	Date	Contact Person	Postal Address	Tel	e-mail
Wetland Impact Assessment	Blue Science	October 2023	Toni Belcher	PO Box 455, Somerset Mall, 7137	Tell:021 851 0555	toni@bluescience.co.za
Terrestrial Biodiversity Impact Assessment	The Biodiversity Company	October 2023	Andrew Husted		Cell: 081 319 1225	info@thebiodiversitycompany.com
Avifaunal Impact Assessment						
Soil and Agricultural Impact Assessment	Johan Lanz	October 2023	Johann Lanz	1A Wolfe Street Wynberg 7800 Cape Town South Africa	Cell:0829279018	johann@johannlanz.co.za
Heritage Impact Assessment	CTS Heritage	September 2023	Jenna Lavin		Cell:0828249308	jenna.lavin@ctsheritage.com
Paleontological Study						
Traffic Impact Assessment	BVi	October 2023	Liza Botha	Edison Square, Century City 7441	Cell:0605577467	lizab@bviwc.co.za

Social Impact Assessment	Solis Environmental Consultants	August 2023	Carli van Niekerk	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531	Cell: 0822208651	carli@environamics.co.za
Visual Impact Assessment	Green Tree Environmental Consulting	September 2023	Yonanda Martin	7 Dublin Street Rangeview Ext 2 Krugersdorp	Cell: 082 409 0405	yonanda@gtec.net.za

1.4 STATUS OF THE BA PROCESS

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

- A site visit was conducted by the EAP 06 July 2023.
- Site notices were erected on site on 06 July 2023 informing the public of the commencement of the BA process.
- A pre-application meeting request was submitted to DFFE on 24 July 2023.
- The DFFE indicated that a pre-application meeting is not required, in an email dated 01 July 2023.
- A newspaper advertisement was placed in the Klerksdorp Records newspaper on 20 July 2023, informing the public of the BA process and for the public to register as I&APs.
- An application form and the draft Basic Assessment Report was submitted to DFFE on 01 September 2023.
- The draft Basic Assessment Report has been made available for a 30-day review and comment period from 01 September 2023 to 03 October 2023.
- An amended Basic Assessment Report has been made available for a 30-day review and comment period from 20 October 2023 to 20 November 2023.
- The final Basic Assessment Report, and amended application form, will be submitted to the DFFE for decision making - following the commenting period for the amended draft BAR.

It is envisaged that the BA process should be completed within approximately three months of submission of the Final Basic Assessment Report, i.e., by December/January 2024 – see Table 1.2.

Table 1.2: Estimated timeframe for completion of the 'BA process'

Activity	Prescribed timeframe	Timeframe
Site visits	-	06 July 2023
Public participation (BID)	30 Days	13 July – 14 August 2023
Submit pre-application meeting request	-	24 July 2023
Conduct specialist studies	-	July - October 2023

Submit application form and DBAR	-	06 September 2023
Public Participation (DBAR)	30 Days	01 September - 03 October 2023
Public Participation (Amended DBAR)	30 Days	20 October - 20 November 2023
Submit FBAR	90 Days	November 2023
Department acknowledges receipt	10 Days	November 2023
Decision	57 Days	January/February 2024
Department notifies of decision	5 Days	January/February 2024
Registered I&APs notified of decision	14 Days	January/February 2024
Appeal	20 Days	February 2024

Table 1.3 below provides more detail on timeframes as well as process flow for the BA process.

Table 1.3: Estimated timeframe for completion of the 'BA process' for the Mooiwater Solar PV1 Project

Tasks to be performed.	July				August				September				October				November				December				January				February				March			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pre-application																																				
Site visits																																				
Public participation																																				
– Press																																				
– On site																																				
– Distribution of																																				
– Complete PP																																				
Specialist inputs and																																				
– Draft terms of																																				
– Receive																																				
'Draft' Basic																																				
- Information																																				
- Report writing																																				
- Circulate 'Draft'																																				
Complete and																																				
– Information																																				
– Complete and																																				
Authority																																				
Amended BAR																																				
- Circulate BAR																																				
Final Basic																																				
– Information																																				
– Report writing																																				
– Submission of																																				

– Approval																																		

The competent authority has 57 days for decision-making after the BAR has been submitted and an additional 5 days to notify the applicant in writing of their decision. The applicant must within 14 days of the date of the decision notify registered I&APs of the decision. Registered I&APs are then provided 20 days in which to lodge appeals. The appeal period expires 20 days after registered I&APs have been informed of the decision according to GNR326, Regulation 7.

1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT

In terms of GN R.960 (promulgated on 05 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulations and 21 – 24 of the EIA Regulations. The requirement for the submission of a Screening Report for the Mooiwater Solar PV1 is applicable as it triggers Regulation 21 of the EIA Regulations, 2014 (as amended).

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

Table 1.4: Specialist studies identified by the DFFE screening tool, Mooiwater Solar PV1 category and specialist studies completed.

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Comment and Appendix
Agricultural Impact Assessment Sensitivity: High Feature(s): Annual crop cultivation/ planted pastures rotation. Low to moderate land capability.	Yes	An Agricultural Impact Assessment is included in Appendix E1 of the draft Basic Assessment Report.
Animal Species Assessment Sensitivity: Medium Feature(s): Presence of sensitive animal species i.e., Mammalia, *Hydrictis maculicollis*	Yes	A Terrestrial Biodiversity Impact Assessment is included in Appendix E2 of the draft Basic Assessment Report.
Aquatic Biodiversity Impact Assessment Sensitivity: Low	Yes	An aquatic assessment is included in Appendix E3 of the draft Basic Assessment Report. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Cultural Heritage assessment included in Appendix E7 of the Scoping Report, as per the requirements of the National Heritage Resources Act.
Avian Impact Assessment Sensitivity: Low	Yes	An Avifaunal Impact Assessment is included in Appendix E4.
Civil Aviation Assessment Sensitivity: Low Feature(s): No major or other types of civil aviation aerodromes have been identified	No	The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. No major or other types of civil aviation aerodromes were found to be located in close proximity of the site. The Civil Aviation Authority has been consulted regarding the development of the project since the commencement of the BA Process. No specific negative impacts or issues have been raised to date by the CAA regarding the project. Proof of attempts to obtain comments from the CAA can be found in Appendix C5. No specialist assessment is therefore recommended. For additional motivation please, refer to Appendix D for the Site Verification Report.
Defence Theme Sensitivity: Low	No	The identification of the site as low sensitivity considering defence is agreed to by the EAP. The South African National Defence Force (SANDF) has been consulted regarding the development of the project since the commencement of the BA Process. No date no comment or

		issues have been raised to date regarding the project. Proof of attempts to obtain comments from the SANDF can be found in Appendix C5.
Landscape / Visual Impact Assessment Sensitivity: Very High Feature(s): The project area is characterised by mountain tops and high ridges	Yes	A Visual Impact Assessment is included in Appendix E5 of the draft Basic Assessment Report.
Palaeontological Impact Assessment Sensitivity: High Feature(s): The project area may comprise features that have a very high paleontological sensitivity	Yes	A Palaeontological impact assessment is included in Appendix E8 of the draft BA Report, as per the requirements of the National Heritage Resources Act.
Plant species Assessment Sensitivity: Medium Feature(s): The project area has sensitive species 691 and Sensitive species 1261	Yes	A Terrestrial Biodiversity Impact is included in Appendix E2 of the draft Basic Assessment Report.
RFI Assessment Sensitivity: Medium Feature(s): The project area falls within 1 km of a telecommunication facility	No	A small section of the affected property infringes into a 1km buffer from a telecommunications facility. However, the remaining extent of the property is indicated as being of a low sensitivity. The South African Radio Astronomy Observatory (SARAO) has been consulted regarding the development of the project since the commencement of the S&EIR 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. OpenServe has also been consulted regarding the development of the project since the commencement of the BA Process. Comments have been obtained by Openserve and can be found in Appendix C5 and C6. Refer to Appendix D for the Site Verification Report.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High Feature(s): The project area comprises of a Critical Biodiversity Area and Endangered Ecosystem (Vaal-Vet Sandy Grassland and Rand Highveld Grassland)	Yes	A Terrestrial Biodiversity Impact is included in Appendix E2 of the draft Basic Assessment Report.
Geotechnical Assessment Sensitivity: Not indicated	No	The detailed Geotechnical Assessment will be conducted before construction begins as part of the micro-siting of the facility layout. The consideration of geotechnical aspects is of a technical concern rather than an environmental concern.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E6.
Traffic Impact Assessment Sensitivity: Not indicated	Yes	A Traffic Impact Assessment is included in Appendix E9.

Kindly refer to the Site Verification Report included under Appendix D of the DBAR. The site verification report further details reasons for exclusion of specialist studies where applicable.

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 D4) has however been undertaken for the development as the site is located just south of the Vaal River and to ensure that the Basic Assessment considers the impact of the development 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 1 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 a BAR as specified in the Regulations		Section in report
Appendix 1. (3) - A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a)	details of -	1
	(i) the EAP who prepared the report; and	
	ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-	
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	

(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered and being applied for; and	
	(ii) a description of the activities to be undertaken including associated structures and infrastructure.	
(e)	a description of the policy and legislative context within which the development is proposed including:	3
	(i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	A motivation for the preferred site, activity and technology alternative.	5
(h)	a full description of the process followed to reach the preferred alternative within the site including –	
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6 & 7

	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcomes of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -	
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(j)	an assessment of each identified potentially significant impact and risk, including-	
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	

(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	6
(l)	an environmental impact statement which contains-	8
	(i) a summary of the key findings of the environmental impact assessment:	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Not applicable
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(p)	a reas1d opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Not applicable
(r)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A to the report
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs);	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	

(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(t)	any specific information that may be required by the CA; and	Not applicable
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

2 ACTIVITY DESCRIPTION

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

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

(b) the location of the activity, including-

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

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

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

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

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

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

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

(i) all listed and specified activities triggered and being applied for;

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

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activities entail the development of a PV solar facility and associated infrastructure on the Remaining Extent of the Farm Mooiwater No. 408. The site is located approximately 16km southeast of the town Viljoenskroon, Free State Province, and situated within the Moqhaka Local Municipality area of jurisdiction (refer to Figure A for the locality map and Figure B for the regional map respectively which are attached in Appendix G of the draft BAR).

The project entails the generation of up to 150MW electrical power through the installation and operation of photovoltaic (PV) panels. An area of 466 ha has been assessed as part of the Basic Assessment process (hereafter referred to as the “development area”). The full extent of the development area has been considered during the BA process hectares (including supporting infrastructure on site, however excluding the overhead power line) with the aim of confirming the suitability from an environmental and social perspective. The property on which the facility is to be constructed will be leased by Mooiwater Solar PV1 (Pty) Ltd from the property owner for the life span of the project (minimum of 20 years).

Energy generated by the facility will be transmitted from the facility substation/Eskom switching station to the existing Mercury Substation via a new 132kV powerline or Zaaiplaats collector substation (an alternative substation).

Confirmation in terms of the preferred alternative for the grid corridor will be based on the negotiations with the landowners and feedback provided by the Eskom Grid Access Unit and will be assessed separately from the Mooiwater Solar PV1 Project. Refer to Table 2.1 for the general site information for the Mooiwater Solar PV1 Project.

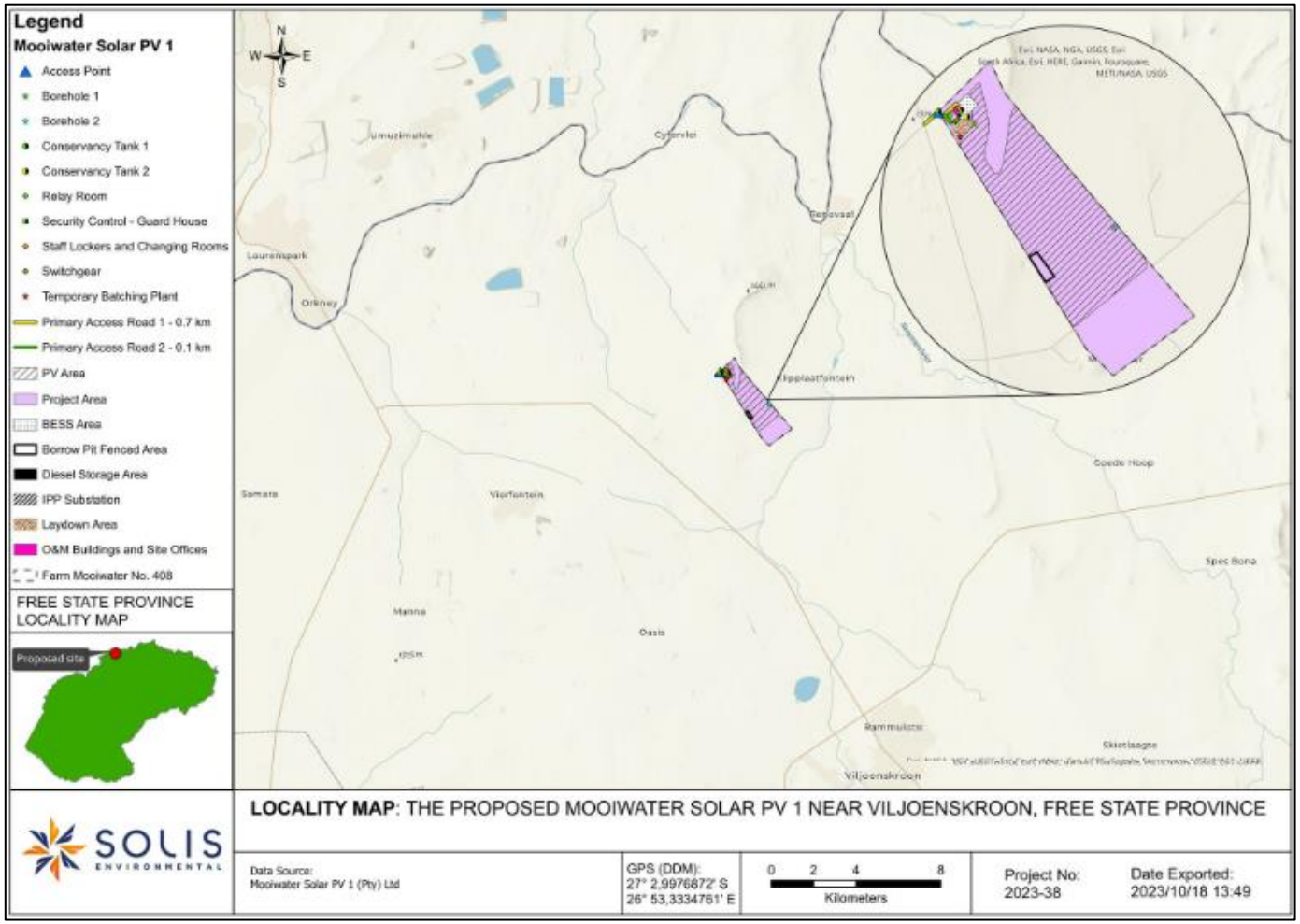
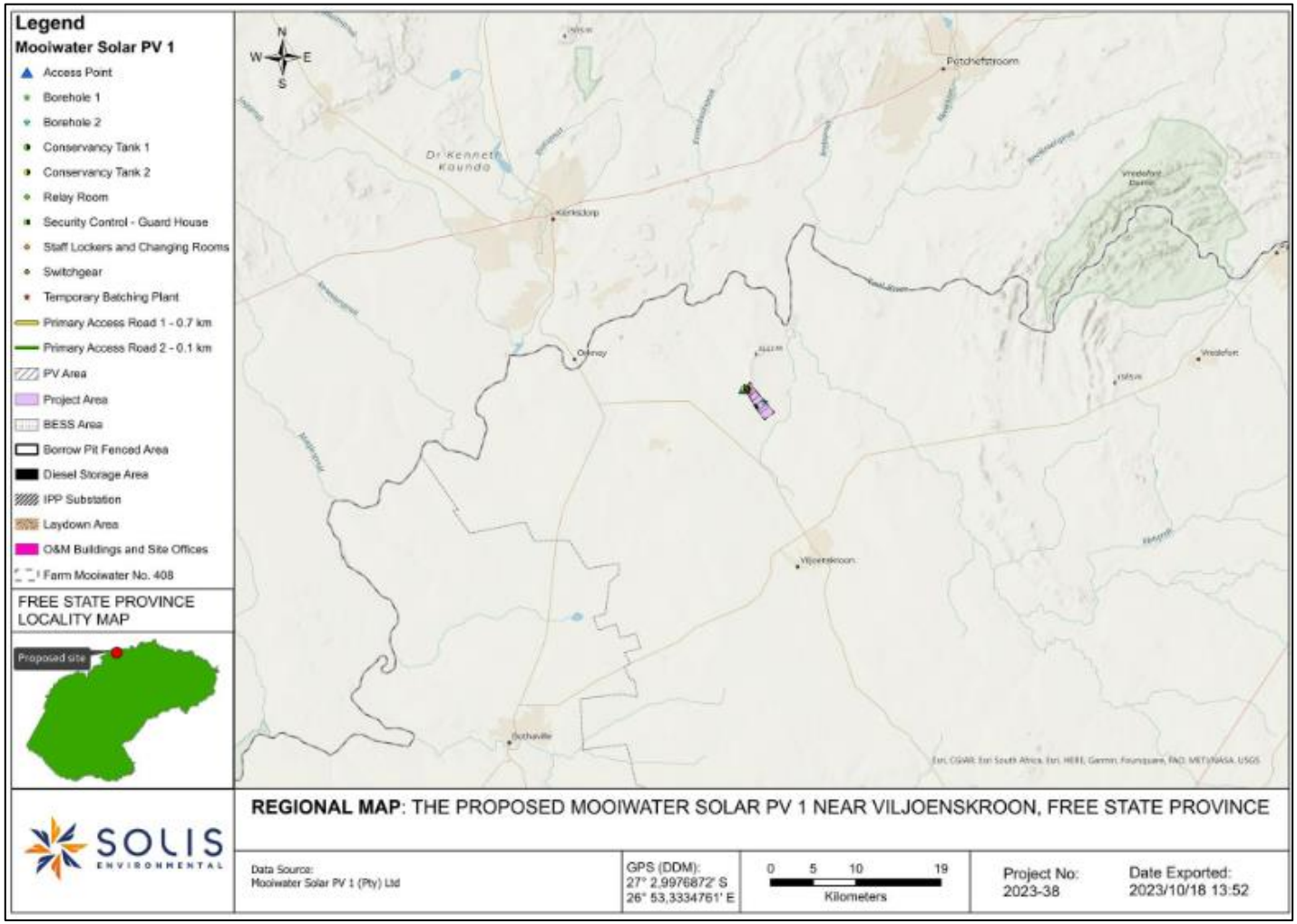


Figure A: Locality Map



REGIONAL MAP: THE PROPOSED MOOIWATER SOLAR PV 1 NEAR VILJOENSKROON, FREE STATE PROVINCE

Figure B: Regional Map

Table 2.1: General site information

Description of affected farm portion	Solar PV Facility (Mooiwater Solar PV1): ● Portion 1 of Farm Mooiwater No. 408 Access Road: ● Access S642 via the R76 Regional Road.
Province	Free State
District Municipality	Fezile Dabi District Municipality
Local Municipality	Moqhaka Local Municipality
Closest towns	The town of Viljoenskroon is located approximately 15 km southeast of the proposed development.
21 Digit Surveyor General codes	Solar PV Facility: ● Portion 1 of Farm Mooiwater No. 408 F03600000000040800001
Photographs of the site	Included in Plates as an appendix to the Report
Type of technology	Photovoltaic solar facility
Structure Height	● Panels up to 4.5 m ● Buildings up to 6 m ● Powerline up to 25 - 32 m ● BESS up to 4.5 m ● Lightning Masts on the switching station up to 25 m
Battery storage	Within a 6-ha area of the development footprint.
Surface area to be covered (Development footprint)	Up to 323 ha
Structure orientation	Tracking system mounted with PV panels. PV panels with single axis tracking is preferred over fixed-axis or double axis tracking systems due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs, resulting in the lowest levelized cost of energy (LCOE).

	The development of the PV facility will take into consideration during the final design phase the use of either single axis or bifacial PV tracking structures. Both options are considered feasible for the site.
Laydown area dimensions (area assessed as part of the EIA)	Assessed 466 ha
Generation capacity	Up to 150MW
Expected production	Up to 446760 MWh

The site is located in a rural area and is bordered by farms where mainly agricultural activities are undertaken and mining activities. The site survey revealed that the affected properties currently consist of grazing cattle as well as crop production (where possible) – refer to plates 1-8- for photographs of the development area.

Further to the Basic Assessment process being undertaken for the Mooiwater Solar PV1, four other solar energy facilities are proposed directly adjacent to the development under assessment. These four developments are known as Utopia Solar PV1 (Located on the Remaining Extent of the Farm Paradys No. 137 and proposed by Utopia Solar PV1 (Pty) Ltd), Paradys Solar PV1 (Located on the Remaining Extent of the Farm Paradys No. 137 and proposed by Paradys Solar PV1 (Pty) Ltd), Witfontein Solar PV1 (Located on the Remaining Extent of the Farm Witfontein No. 444 and proposed by Witfontein Solar PV1 (Pty) Ltd), and Rudolph Solar PV1 (Located on the Remaining Extent of the Farm Rudolph No. 48 and proposed by Rudolph Solar PV1 (Pty) Ltd) (see Figure C below).

It should be noted that these four developments are part of four separate EIA applications and processes.

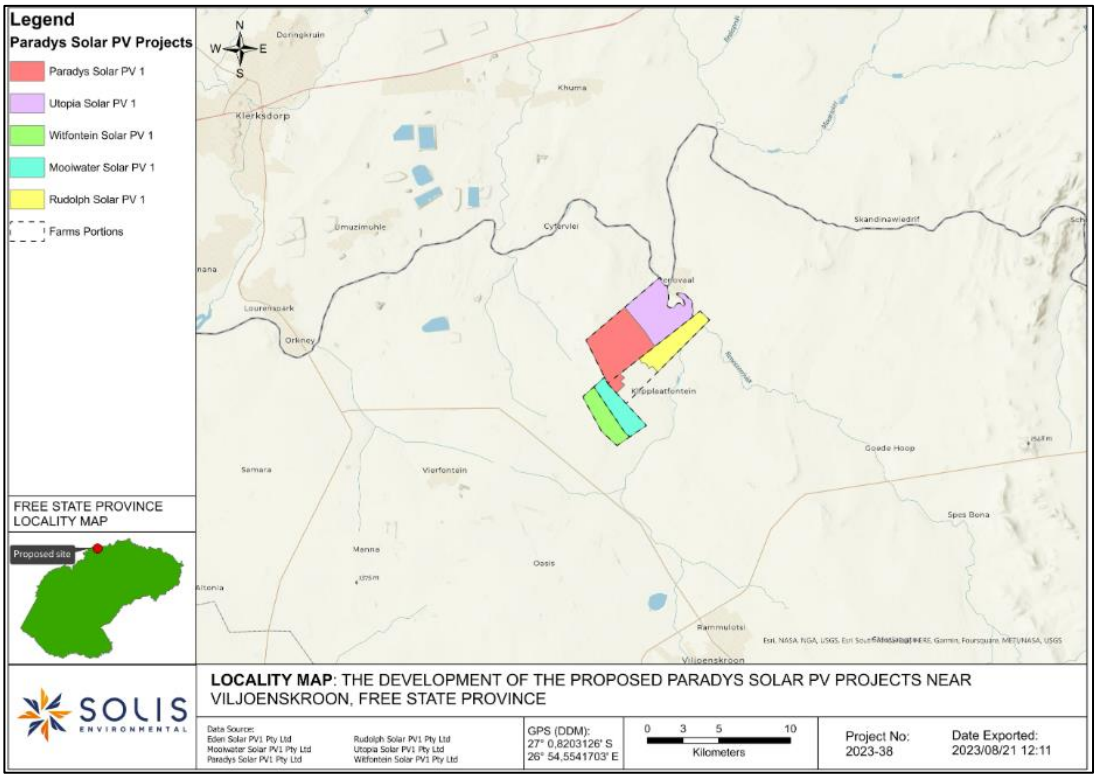


Figure C: Combined locality map

2.2 ACTIVITY DESCRIPTION

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

The EIA Regulation No. 327, 325 and 324 outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

Table 2.2: Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
Listing Notice 1, 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."*

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		• 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 combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres. The proposed development will have a diesel storage facility which will serve to store goods are required for construction activities to be undertaken during the construction phase, including the operation of machinery and equipment, as well as during the operation phase for the undertaking of routine maintenance activities. The solar energy facility will require the installation of a standard diesel storage container will likely be the approximate size of a 2.5 * 2.5 * 6m shipping container. The container will be bunded.
Listing Notice 1, GNR 327 (as amended in 2017)	Activity 19 (i)	• *"The infilling or depositing of any material of more than 10cubic metres into, or the dredging, excavation, removal or moving of soil sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse but excluding where such infilling, depositing, dredging, excavation, removal or moving—will occur behind a development setback; is for maintenance purposes undertaken in accordance with a maintenance management plan; falls within the ambit of activity 21 in this Notice, in which case that activity applies; occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies."*

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		• Activity 19 is triggered small artificial seep wetland which is highly degraded and is located within the site and the development footprint of the Mooiwater Solar PV1. This infilled with mostly be of the surrounding soil that will be for the placement of the development footprint. No hard infrastructure will be developed on with regard to these wetlands. The aquatic features that fall outside of the development area are deemed no go areas with 50m buffers applied around them.
Listing Notice 1, GNR 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters; but excluding a road—(a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter."* • Activity 24(ii) is triggered as internal and perimeter roads to be considered will vary between 6 and 8meter width.
Listing Notice 1, 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 farm has been previously used for grazing and the property will be re-zoned to

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		"special" use. The total development footprint will be 466 hectares.
Listing Notice 1, GNR 327 (as amended in 2017)	Activity 56(ii)	• *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres….excluding where widening or lengthening occurs inside urban areas"* • Activity 56 (ii) is triggered as existing roads will require widening of 8m and/or lengthening by more than 1 km, to accommodate the movement of heavy vehicles and cable trenching activities. The access road will be widened to 8m and the internal roads will be widened to 6m. The access roads will be lengthened by up to 1.6km and the internal roads will be lengthened by up to 25km
Listing Notice 2, 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 up to 150 megawatts electricity through the use of a renewable resource.
Listing Notice 2, 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*

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		purposes undertaken in accordance with a maintenance management plan." ● The cumulative area of indigenous vegetation to be cleared for the entire project (excluding linear activities) will exceed 20 ha. The exact amount of vegetation clearance is 294ha.This area is comprised of modified and degraded Vaal-Vet Sandy Grassland and Rand Highveld Grassland areas.
Listing Notice 3, GNR 324 (as amended in 2017)	Activity 4 (b)(i)(ee):	● *"The development of a road wider than 4 metres with a reserve less than 13,5 metres (b) in the Free State, (i) outside urban areas and within, (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* ● Activity 4 (b)(i)*(ee):* is triggered as internal and perimeter access roads with a width of between 6 and 10 meters will be constructed and a portion of the site is located in a Critical Biodiversity Area 1 (CBA1). Only a small portion of the site falls within a CBA1 in the northeastern corner. This area is already highly disturbed and degraded and falls within a medium sensitivity, therefore, avoidance is not recommended, the development area located in the CBA1 should adhere to the maintenance of basal vegetation cover beneath the solar panels. The project also overlaps with ESA 1 and 2 areas as indicated by the Free State Systematic Biodiversity Plan produced by the Department of Economic, Small business development, Tourism and Environment (DESTEA). The impacts of a proposed development should therefore be

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		determined from the provincial systematic biodiversity plan.
Listing Notice 3, GNR 517 (as amended in 2021)	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/or oils) in containers with a capacity of less than 80 metres 3 and the size pf the container is (2.5*2.5*6m). A portion of the site is located in a Critical Biodiversity Area 1 (CBA1). Only a small portion of the site falls within a CBA1 in the northeastern corner. This area is already highly disturbed and degraded and falls within a medium sensitivity, therefore, avoidance is not recommended, the development area located in the CBA1 should adhere to the maintenance of basal vegetation cover beneath the solar panels. The project also overlaps with ESA 1 and 2 areas as indicated by the Free State Systematic Biodiversity Plan produced by the Department of Economic, Small business development, Tourism and Environment (DESTEA). The impacts of a proposed development should therefore be determined from the provincial systematic biodiversity plan.

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
Listing Notice 3, GNR 324 (as amended in 2017)	Activity 12 (b)(ii)(iv):	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Free State (ii) within critical biodiversity areas identified in bioregional plans and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of watercourse or wetland."* • Activity 12(b)(ii)(iv) is triggered since the project site falls with a Critical Biodiversity Area 1 (CBA1). A seep wetland was identified on or within the 100m of the project site. Only a small portion of the site falls within a CBA1 in the northeastern corner. This area is already highly disturbed and degraded and falls within a medium sensitivity, therefore, avoidance is not recommended, the development area located in the CBA1 should adhere to the maintenance of basal vegetation cover beneath the solar panels. The project also overlaps with ESA 1 and 2 areas as indicated by the Free State Systematic Biodiversity Plan produced by the Department of Economic, Small business development, Tourism and Environment (DESTEA). The impacts of a proposed development should therefore be determined from the provincial systematic biodiversity plan.
Listing Notice 3, GNR 324 (as amended in 2017)	Activity 18 (b)(i)(ee)(hh):	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (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 18 (b)(i)(ee)(hh) is triggered since the existing access road to the site will need to be

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
		widened by more than 4 metres. The project is located within the Free State Province and outside urban areas. A portion of the site is located in a Critical Biodiversity Area 1 (CBA1) and wetland systems were identified on site and within the 500m Regulated Area. Only a small portion of the site falls within a CBA1 in the northeastern corner. This area is already highly disturbed and degraded and falls within a medium sensitivity, therefore, avoidance is not recommended, the development area located in the CBA1 should adhere to the maintenance of basal vegetation cover beneath the solar panels

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

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

- Civil works to be conducted:

- Terrain levelling if necessary – Levelling will be minimal as the potential site chosen is relatively flat.
- Laying foundation - The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
- Construction of access and internal roads/paths – The majority of the access road will follow existing, gravel farm roads that may require widening up to 6 to 12 m (inclusive of storm water infrastructure). Where new sections of road need to be constructed/lengthened, this will be gravel/hard surfaced access road and only tarred if necessary. A network of gravel internal access roads and a perimeter road, each with a width of up to 6 m, will be constructed to provide access to the various components of the PV development. Access will be obtained off the R76 regional road.
- 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 comp1nts of the proposed project are described below:

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 comp1nts of the proposed project are described below:

- PV Panel Array - To produce up to 150MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be mounted on a single-axis tracking system. The tracking system will follow the sun from east to west during the day, maximising the amount of solar radiation falling onto the surface on the panels, thereby maximising their yield.

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

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from the inverter's output voltage to 33kV (the typical medium voltage levels encountered in a utility scale PV facility) to 132kV (at which voltage level power will be fed into the Eskom grid). The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is stepped up in transformers to 132kV. An onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed power line (which will be assessed as part of a separate Basic Assessment). It is expected that generation from the facility will connect to the national grid. Corridor will cover options to connect to the Mercury Substation or the Zaaiplaats Solar PV1 collector substation (a planned substation, under development by Mulilo, that forms part of the Mercury Solar PV cluster).

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain 1.5m underground as far as practically possible.

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:
    - Operations & Maintenance Building / Office
    - Switch gear and relay room
    - Staff lockers and changing room
    - Security control
    - Offices
    - Ablutions with conservancy tanks
    - Construction camps (on laydown area)
    - Workshop (Part of O&M Buildings)
    - Temporary sanitation facilities during construction
    - Storage Warehouse (Part of O&M Buildings)
    - Disel Storage Area

- Battery storage – Battery Storage Facilities will make use of solid state or flow battery technology with a maximum height of 5m and a capacity of 2500MWh will be installed in a 6-hectare area.

- Roads - Primary Access is most likely to be obtained via the R76 Regional Road. This will be confirmed in the Traffic Impact Assessment which has been commissioned. An internal site road network will also be required to provide access to the solar field and associated infrastructure.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 3-4.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan considers and adheres to the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site (refer to Figures A to J). The total surface area proposed for the layout includes the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power line, battery energy storage system, on-site substation and switching station and perimeter fences). Limited features of environmental significance exist on site, however the sensitivities that do exist have to be avoided in the layout of the solar facility. Table 2.3 below provides detailed information regarding the layout for the proposed facility (refer to Figures 2.1 and 2.2).

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	Up to 4.5 meters
Area of PV Array	Up to 304,2 ha
Area occupied by inverter / transformer stations / substations / BESS	BESS: Up to 4.7 ha Facility substation: Up to 1 ha Collector Substation: Up to 1 ha

Capacity of on-site substation	132kV
Area occupied by both permanent and construction laydown areas	Up to 12.7 ha
Area occupied by buildings	A 33 kV switch room, a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre: Up to 12.5 ha
Battery storage facility	Maximum height: ~5m Storage capacity: 2500MWh
Length of internal roads	Approximately 16 km
Power line servitude width	31m

Table 2.4 provides the co-ordinate points for the proposed project site and associated infrastructure.

Table 2.4: Development co-ordinates

Co-ordinates			
Site Boundary	A	27° 2'11.84"S	26°52'26.10"E
	B	27° 1'51.13"S	26°52'50.12"E
	C	27° 2'4.15"S	26°52'57.11"E
	D	27° 3'39.39"S	26°54'25.19"E
	E	27° 4'5.08"S	26°53'47.48"E
	F	27° 3'54.23"S	26°53'35.42"E
	G	27°03'15.57"S	26°53'9.25"E
	H	27°02'15.06"S	26°52'28.27"E
Supporting Infrastructure			
Laydown Area 1	1	27° 2'16.76"S	26°52'30.79"E
	2	27° 2'24.14"S	26°52'35.70"E
	3	27° 2'17.05"S	26°52'43.33"E
	4	27° 2'13.58"S	26°52'39.54"E
Diesel Storage Area	E	27° 2'13.44"S	26°52'34.48"E

	F	27° 2'12.27"S	26°52'35.78"E
	G	27° 2'13.49"S	26°52'37.00"E
	H	27° 2'14.58"S	26°52'35.78"E
O&M Buildings	1	27° 2'10.98"S	26°52'46.52"E
	2	27° 2'8.88"S	26°52'34.48"E
	3	27° 2'11.26"S	26°52'36.95"E
	4	27° 2'13.44"S	26°52'34.48"E
BESS	A	27° 2'8.97"S	26°52'34.57"E
	B	27° 2'4.41"S	26°52'39.61"E
	C	27° 2'8.91"S	26°52'44.62"E
	D	27° 2'15.84"S	26°52'36.99"E
	E	27° 2'14.59"S	26°52'35.77"E
	F	27° 2'13.51"S	26°52'37.03"E
	G	27° 2'11.31"S	26°52'36.97"E
	H	27° 2'8.85"S	26°52'34.50"E
IPP Substation	1	27° 2'15.70"S	26°52'36.92"E
	2	27° 2'18.12"S	26°52'34.38"E
	3	27° 2'15.77"S	26°52'31.85"E
	4	27° 2'13.44"S	26°52'34.44"
Eskom Switching Station	1	27° 1'58.13"S	26°52'46.52"E
	2	27° 2'13.49"S	26°52'29.41"E
	3	27° 2'15.77"S	26°52'31.85"E
	4	27° 2'13.44"S	26°52'34.44"E

The Figure provided below correspond to the point location as presented on Table 2.4 above.

Figure 2.1: Co-ordinates points of the project boundary

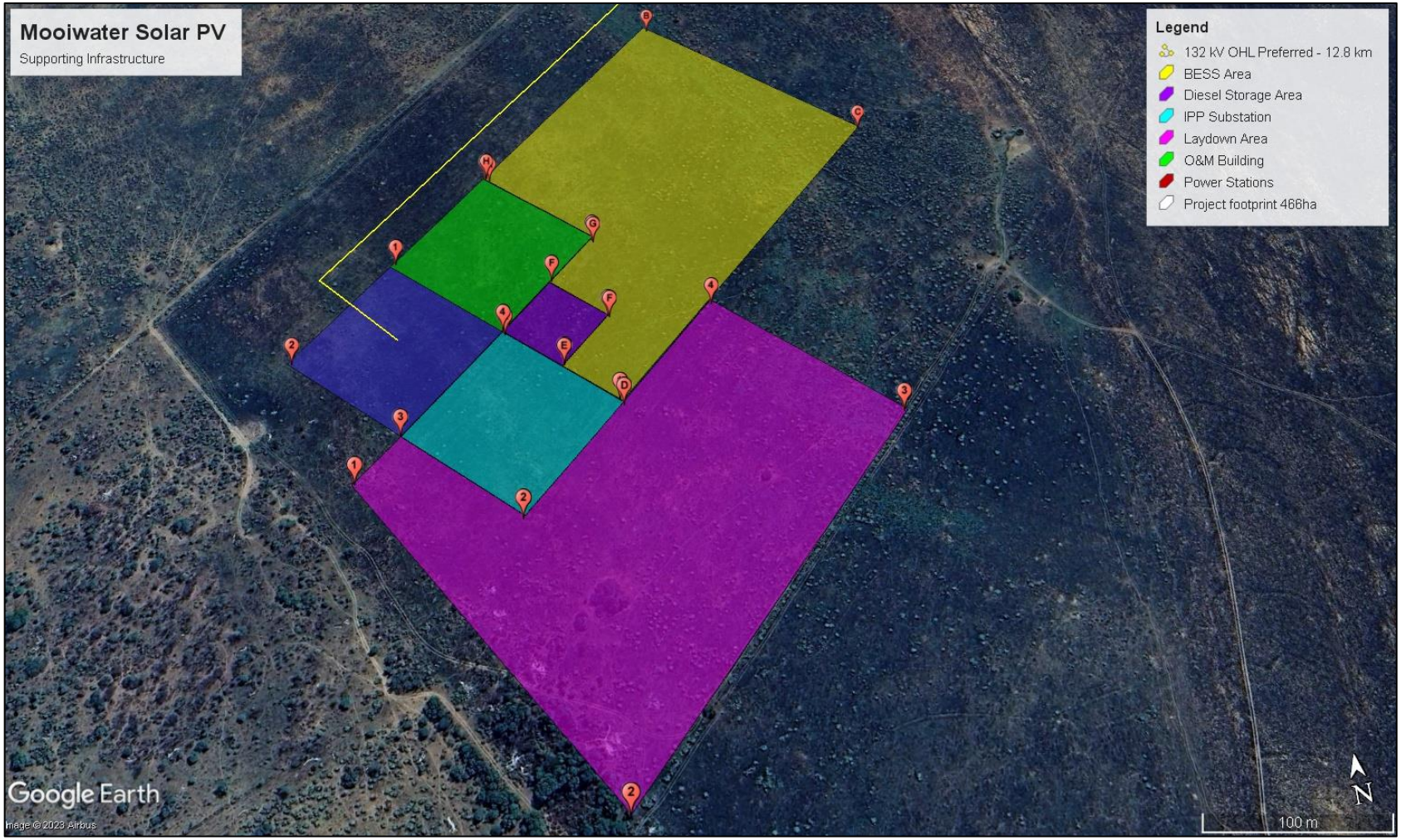


Figure 2.2: Co-ordinate points of supporting infrastructure

2.5 SERVICES PROVISION

The following sections provide 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. Three options will be considered, in order of priority by the Developer:

1. Water will be trucked from the nearest municipality water take-off point during construction phase. During the operational phase, supply will be sourced from the Local Municipality (LM). The Developer will approach the Local Municipality to enquire whether they can provide all or part of the total water requirements of the Project. Specific arrangements will be agreed with the Local Municipality in a Service Level Agreement (SLA), following the appointment of preferred bidder during the financial close period.

2. Water will be abstracted from an existing borehole within the affected property, subject to NWA requirements.

3. A new borehole on site, subject to NWA requirements.

The estimated amount of water required during construction phase (18 to 24 months) is 7800 m^3 (14 247L per day). The estimated amount of water required during the operational phase is 1027 m^3 (2813L per day). Water saving devices and technologies such as the use of dual flush toilets and low flow taps, the management of storm water, the capture and use of rainwater from gutters and roofs 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 where possible. Stormwater management and mitigation measures will be included in the Environmental Management Programme (EMPr) - refer to Appendix F1.

2.5.3 Sanitation

During construction phase, portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Wastewater will be disposed of at a licensed landfill site.

No effluent will be produced during operation of the facility, except for normal sewage from site and operations staff. Formal sanitation (such as chemical or water borne sanitation facilities) will be provided as far as practically possible.

2.5.4 Solid Waste

During the construction phase, solid waste will mainly be in the form of construction material, hazardous waste (i.e., fuel, grease, etc.), excavated substrate and domestic solid waste. All waste will be disposed of in scavenger proof bins and temporarily placed in a central location for removal by an appointed contractor and disposed into a registered landfill site. Where possible the re-use and recycling of waste material will be encouraged. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility. The relevant Local Municipality(s) will be contacted to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (30 years). During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality particularly where re-use and recycling is not practical.

2.5.5 Electricity

Electricity supply during construction will be provided by either on-site diesel generators or arranged with the Local Municipality or Eskom Distribution, via an existing or new 11 kV powerline. During operation, the electricity will be supplied by the PV facility/ via the main grid connection or via the installed construction supply. Efficient electricity appliances will be used as far as possible on site. Where possible, borehole pumps will be powered by solar energy.

2.6 DECOMMISSIONING OF THE FACILITY

The operating period will be 20 up to 30 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the facility'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 is the same, but faster and more efficient). If, for whatever reason the PV facility 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 (if implemented) would be responsibly removed and the area would be rehabilitated.

- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

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

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and

Restoration of the surface to the original contours and application of hydro seeding.

3 LEGISLATIVE AND POLICY CONTEXT

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

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

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

3.1 INTRODUCTION

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

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2218 (Act 34 of 2218)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The National Forests Act, 1998 (Act 84 of 1998)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)

- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Free State Provincial Spatial Development Framework (PSDF) (2012)
- Fezile Dabi District Municipality Final Integrated Development Plan (IDP) 2022-2027
- Moqhaka Local Municipality Final Integrated Development Plan (IDP) 2022-2027

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

3.2 LEGISLATIVE CONTEXT

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

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 "every1 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 Mooiwater Solar PV1 Project and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.
The National Environmental Management Act	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary;

(Act No. 107 of 1998)	and the Environment) and the Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		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, as amended on 11 June 2021 (GN 517). The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. The BA process undertaken for the Mooiwater Solar PV1 Project 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	1 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 Mooiwater Solar PV1 Project is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.
The National Water Act **(Act No. 36 of 1998)**	Department of Water Affairs (now known as Department of Water and Sanitation)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it

			provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The National Water Act will be applicable in terms of obtaining the relevant license for the water uses triggered.
National Environmental Management: Waste Act **(Act No. 59 of 2008)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered.

National Environment Management: Air Quality Act **(Act No. 39 of 2004)**	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
The National Heritage Resources Act **(Act No. 25 of 1999)**	South African Heritage Resources Agency (SAHRA)	1999	The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a “heritage resource” includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may

			request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file with reference number 21389 has been opened on SAHRIS for the Mooiwater Solar PV1 Project and all relevant documents were submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar PV facility is included as Appendix E7.
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, Land Reform and Rural Development (DALRRD) 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 have been provided for the Mooiwater Solar 1 Project and included as Appendix E1.
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 Terrestrial Biodiversity Impact Assessment has been undertaken for the Mooiwater Solar PV1 Project and is included in Appendix E2.

3.3 POLICY CONTEXT

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

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. Mooiwater Solar PV1 Project 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 Mooiwater Solar PV1 Project is in line with this paper as it proposes the generation of renewable energy from the solar resource.
Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a "living plan" which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030. "*This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation".* In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables, which relates to the proposed Mooiwater Solar PV. 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 menti1d 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 Mooiwater Solar PV1 Project 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. 1 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 Mooiwater Solar PV1 Project 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, 1 (1) regional integration, and 1 (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 Mooiwater Solar PV1 Project 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 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, 1 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 Mooiwater Solar PV1 Project 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 Mooiwater Solar PV1 Project comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Climate Change Bill	National Department of Forestry, Fisheries and the Environment	2021	The Department of Forestry, Fisheries and the Environment has published a new Climate Change Bill for public comment. The bill notes that climate change represents an urgent threat to human societies and the planet, and requires an effective, progressive and incremental response from both government and citizens. It recognises that South Africa has a global responsibility to reduce greenhouse gasses and that the anticipated impacts arising as a result of climate change have the potential to undermine achieving of the country's developmental goals. The main objective of the bill is to enable the development of an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society, and to provide for matters connected therewith. The Mooiwater Solar PV1 Project comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee	2010 - 2030	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and

			enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility: ● SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. ● SIP 9: Electricity generation to support socio-economic development: The proposed Mooiwater Solar PV is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Mineral Resources and Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. The Mooiwater Solar PV1 Project could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-menti1d 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 Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissi1d 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 1 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 site falls within the Klerksdorp REDZ (refer to Figure G submitted with Appendix G of the Amended BAR).
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. 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 Mooiwater Solar PV1 Project is in-line with the framework based on the contributions and opportunities presented by a development of this nature.
Fezile Dabi District Municipality Reviewed Final Integrated Development Plan (IDP)	Fezile Dabi District Municipality	2022-2027	The long-term vision of the Fezile Dabi DM is: "Improving the lives of citizens and progressively meeting their basic, social and economic needs, thereby restoring community confidence and trust in government". The above stated vision defines what Fezile Dabi District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialise, their mission is that: "Fezile Dabi District Municipality will strive to be a more responsive and accountable municipality towards sustainable development".

			Of the eighteen (18) SIPs that are contained in the National Infrastructure Plan (NIP), there are eight which impact on the Fezile Dabi District and therefore need to be recognised and where appropriate; the municipality's plans will be aligned with these SIPs in an effort to respond to national government's service delivery initiatives. Furthermore, work is to be d1 to align key cross-cutting areas, namely human settlement planning and skills development in line with each of the Strategic Infrastructure Projects, especially: ● Green Energy in support of the South African economy (SIP 8): Supporting 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). ● Electricity Generation to support socio-economic development (SIP 9): acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy; and addressing historical imbalances. Considering the plans for the alignment of the DM's plans with SIP 8 and SIP 9 it is confirmed that the Mooiwater Solar PV1 Project is in line with the plan.
Moqhaka Local Municipality Final Integrated Development Plan (IDP)	Moqhaka Local Municipality	2022 - 2027	The vision of the Moqhaka LM is to "…strive to *be a Municipality that creates an enabling environment for socio-economic growth and sustainable development."* The Mission Statement is *"To maintain and enhance quality of life by providing effective, efficient quality and affordable services equitably and facilitating sustainable socio-economic growth through active community participation."* The vision and mission of the municipality have led to the conceptualisation of the following strategic objectives below: ● Broaden access and improve quality of municipal services.

- Create an environment that promotes the development of the local economy and facilitates job creation.
- Build united, non-racial, integrated and safer communities.
- Promote a culture of participatory and good governance.
- Improved organisational cohesion and effectiveness.
- Improve overall financial management by developing and implementing appropriate financial management policies, procedures, and systems.

The development of Mooiwater Solar PV1 Project will contribute to the local economy of the area and therefore assist (albeit to a limited extent) with socio-economic growth and therefore contribute to the strategic objectives of the LM.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

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

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2020)[3]
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- 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

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

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

3.6 CONCLUSION

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

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

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the development of the Mooiwater Solar PV1 Project. 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 Mooiwater Solar PV1 Project is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

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

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

(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

4.1 THE NEED FOR THE PROPOSED ACTIVITY

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

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2218 fossil-fuel CO_2 emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 an article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (source: https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818).

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

During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years. During the recent 2023 State of the Nation Address, the government has embarked upon allowing private developers to generate electricity. There are now

more than 100 projects, which are expected to provide over 9 000 MW of new capacity over time. A number of companies that have participated in the renewable energy programme will soon enter construction and deliver a total of 2 800 MW of new capacity. Through the Just Energy Transition Investment Plan, R1.5 trillion will be invested in our economy over the next five years in new frontiers such as renewable energy, green hydrogen and electric vehicles. A number of projects are already underway, including the development of a new facility by Sasol at Boegoebaai in the Northern Cape, the Prieska Power Reserve in the Free State, and the Hydrogen Valley initiative in Limpopo, Gauteng and KwaZulu-Natal.

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 that was made available for comment and updated to the draft IRP 2019 as per table 4.1 below:

Table 4.1: Published Draft IRP 2019 (Approved by Cabinet for Consultation)

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37 149		1 860	2 100	2 912	1 474	1 980	300	3 830	499
2019	2 155	-2373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1 433	-557				114	300			
2021	1 433	-1403				300	818			
2022	711	-844			513	400 1000	1600			
2023	750	-555				1000	1600			500
2024			1860				1600		1000	500
2025						1000	1600			500
2026		-1219					1600			500
2027	750	-847					1 600		2000	500
2028		-475				1000	1 600			500
2029		-1694			1575	1000	1 600			500
2030		-1050		2 500		1 000	1 600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33364		1860	4600	5000	8288	17742	600	6380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
Committed / Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

According to the South African Energy Sector Overview (2021), there is currently 1 723 MW of installed PV capacity, while an additional 2 600 MW and 860 MW from wind and solar has been rewarded as part of Bid window 5 and 6, respectively (latter announced in 2022).

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

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

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the 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 solar PV facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment. Additionally, this will also create local business opportunities benefitting the socio-economic development of the MLM and the local community of Viljoenskroon. The local communities will however benefit from the establishment of a Community Trust, albeit if is managed effectively.
- Lower costs of alternative energy - An increase in the number of solar facilities commissi1d will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuel at the existing grid-connected PV facilities and plants which would likely be built in the absence of the project activity.

- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in non-renewable electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the PV facility. In future, this experience can be employed at other similar solar installations in South Africa.
- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 380 employment opportunities will be created during the construction phase and up to 17 permanent employment opportunities during the operational phase. There will also be additional positive impacts that will lead to the creation of local employment, stimulating the local economy, business opportunities, and opportunities for skills development and on-site training and the potential for up- and downstream economic opportunities for the impacted community.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources – The predominant land use of the site is limited to grazing and some crop fields. The proposed development in this specific area will generate alternative land use income through rental for the proposed energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities. Due to the fact that the agricultural land loss is not of viable cropland and that its negative impact is offset by economic benefits to farming, the overall negative agricultural impact of the development is assessed here as being of low significance.

- Location of the activity within a REDZ - The Renewable Energy Development Zone (REDZ) have a key role to play in South Africa's just energy transition. The REDZ create priority areas for investment in the electricity grid. Since the site is located within a REDZ it contributes to the desirability of the project. The development area chosen for the Rudolph Solar PV1 Project is within a REDz. As stated in the Soils and Agricultural Compliance Statement (Appendix E1), the area has specifically been designated within South Africa for the prioritisation of renewable energy development. The designation of the REDZ has taken into account the country's need to balance renewable energy development against the conservation of land required for agricultural production and national food security. Every effort however has been taken to avoid all highly sensitive features found on site. Therefore, even though the site is designated as a REDz, the amended draft layout plan has made every effort to ensure that the environmental integrity of the site is maintained as far as possible.

- Increased access to electricity: Despite the abundant availability of coal, electricity generation and the development of related infrastructure has been inadequate in providing access to electricity for entire population of approximately 60 million people. South Africa has been described as a country with an energy-deprived population with more than 1.5 million households comprising approximately 5 million people that are without electricity. The national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.

- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified post mitigation. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this 1, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

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

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

(h) a full description of the process followed to reach the proposed preferred alternative, within the site, including –

(i) details of all the alternatives considered;

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

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

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

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

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

(xi) a concluding statement indicating the preferred alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

The 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 screening was conducted by the developer of the affected properties and the farm portions were found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. These factors were then taken into consideration and avoided as far as possible.

The following alternatives were considered in relation to the proposed activity and all specialists should also make mention of these:

Location alternatives

No other possible sites were identified on the Remaining Extent of the Farm Mooiwater No. 408. This site is referred to as the preferred site. The Mercury Substation is located approximately 5 km from the preferred site. Connection to the grid plays a vital role in the site location for renewable energy facilities. The location of the preferred site shortens the length of the required grid connection in order to evacuate energy into the national grid. There are some sensitive features that occur on the site, However, the size of the site makes provision for the exclusion of sensitive environmental features that have been found through the BA process. The preferred site was chose due to its favourable climatic conditions, topography (i.e. slope), environmental conditions (i.e. low agricultural potential in developable areas) as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase) as well as the sites inclusion in the Klerksdorp REDZ.

Throughout the BA process provision was made to consider the results of the specialist studies to exclude the sensitive areas present, which includes the no-go buffer areas recommended by the specialist studies. The sensitive areas and associated buffers have been considered and incorporated into the final layout to optimise the layout for avoidance of the environmental sensitivities identified.

From a technical perspective, pre-feasibility investigations have been undertaken by the engineering team for the proposed project, determining the potential yield and availability of land. Thus far the site has proven to have the following benefits from an engineering perspective:

- The project site is relatively close to the Mercury main transmission substation. The closer a renewable energy project can be constructed to a substation, the lower the cost of the overhead power lines will be. This ultimately reduces the tariff and makes the project more competitive. According to Eskom's latest GCCA reports. The Mercury substation has capacity available to accommodate renewable electricity generation.

- Excellent solar PV yield potential, considering the project is located outside of the Northern Cape province.

- The area is already very flat, making construction of the project relatively simple.

The landowners are supporting this development and want their properties to be utilized for this purpose.

The developer has therefore pursued an environmental assessment process to ensure compliance with the relevant regulations, and to allow for specialist input to refine, the area of use. As per the final layout plans, areas of no-go have been avoided and only where specialists have confirmed the acceptable use of land, has infrastructure been proposed.

Initial locality alternatives were undertaken based on the following:

Environmentally, agricultural sensitivity reporting by the developer indicated that the selected sites were within an acceptable sensitivity range, compared to other sites that were assessed and deemed high – very high sensitivity. Technically, constraints of the available land that deemed from the

developers site selection process were further refined to willing landowners and proximity to existing Eskom infrastructure.

Following the high-level location alternatives, the identification of the proposed site took the following into account:

- The site must be located in an area of high solar radiation.
- The site must have low agricultural potential
- The site topography must be fairly flat.
- The site must be large enough to accommodate the proposed solar PV facility.
- There must be a grid connection point in proximity to the proposed project.
- The landowner must be willing to accommodate the proposed development.
- The cost of leasing the land must not constitute a fatal flaw to the feasibility of the project.

Following identification of areas which fit these criteria, landowner discussions are undertaken. Unsuccessful landowner negotiations constitute a fatal flaw and other sites must then be sought. The site locality of the proposed project is based on a combination of all considerations above and successful landowner discussions. It is therefore the only reasonable and feasible site which can be considered in detail as part of the environmental authorisation process.

Battery storage facility

It is proposed that a nominal up to 2500 MWh Battery Storage Facility for grid storage would be housed in stacked containers, or multi-storey building, with a maximum height of 5m with associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. The preferred battery technology is Lithium-ion. The assessment of the impacts and risks associated with the BESS is be included in the BAR in section 6 below. The preferred battery technology is transported preassembled on site and does not trigger a listing notice and does not require a high level risk impact assessment.

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.

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 5.3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for grazing of cattle and crop production (refer to the photographs of the site included in the plates).

The current land use is predominantly agriculture and livestock grazing and the associated impacts caused by this, to the terrestrial ecology is considered to be medium (refer to Appendix E2). If the land use is well managed, then the long-term impacts to the local ecology will continue to be low - this will require that grazing areas are rotated, grazing capacities are sustained, and stocking densities are controlled. Under the current circumstances, the 'no-go' alternative is considered to represent a low-medium long-term negative impact on the environment. However, it is noted that if the current land uses are left unmanaged for the foreseeable future, it is probable that the ecological integrity and functioning of the grassland area will deteriorate.

The Soils and Agricultural Compliance Statement (Appendix E1) has confirmed that the site falls within an area that is classified as a Protected Agricultural Area. A Protected Agricultural Area is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, has made important contributions to the production of the various crops that are grown across South Africa. The cropping potential of the solar application area is, however, limited by the combination of climate (fairly low rainfall) and soil depth constraints. The limited depth, in combination with the low rainfall, provides an insufficient moisture reservoir to carry a crop through the season and limits the land's agricultural potential to grazing only.

The Wetland and Aquatic Impact Assessment (Appendix E3) indicates that the No-Go Alternative would imply that the proposed development site would not be utilised for the proposed PV Facility but would continue to be utilised for agriculture. The wetland areas within the site are periodically utilised and hence their current modified ecological condition. It could be expected that this practice would continue to occur and would result in an ongoing degradation of the wetlands. From an aquatic ecosystem perspective, there could thus be expected would be little difference in the potential aquatic ecosystem impacts.

The implementation of the no-go alternative is therefore not preferred.

5.1.2 Location Alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the project. No other properties have at this stage been secured by Mooiwater Solar PV 1 (Pty) Ltd in the Viljoenskroon area to potentially establish the solar energy facility. From a local perspective, the Remaining Extent of the Farm Mooiwater No 408, is preferred due to its suitable climatic conditions and solar resource, topography (i.e. in terms of gradient), environmental conditions (i.e. ecological sensitivity), proximity to a feasible grid connection point (i.e. for the purpose

of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase). The proposed development falls within an area used for grazing and crop production. The solar application area was specifically selected within the farms to avoid viable croplands. The croplands are all located on the deep Hutton and Avalon soils that exist as a fairly small proportion of the predominantly shallow soils in the area. Furthermore, the Soils and Agricultural Impact Assessment (Appendix E1) has indicated medium agricultural impacts due to the limited depth, in combination with the low rainfall, provides an insufficient moisture reservoir to carry a crop through the season and limits the land's agricultural potential to grazing only.

Within the affected property, an area of 466 hectares has been assessed and a preferred development footprint has been designed within this area. The proposed development forms part of a larger cluster of solar energy facilities, the location of the entire cluster as a whole has been considered by the developer as well as the opportunities presented by the area under assessment that will be able to house such a cluster. Therefore, no alternative areas for the development footprint within the affected property have been considered for the placement of infrastructure based on feedback from the landowner and the current land use areas (i.e. productive agricultural areas). Therefore, there is a single preferred location alternative that will be assessed – refer to Figure 5.1.

Figure 5.1: Location of the single preferred location alternative

5.1.3 Activity Alternatives

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

- Photovoltaic (PV) solar facility – Mooiwater Solar PV1 (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa.

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

- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water, and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also within the local area. While the irradiation values are high enough to generate sufficient solar power (refer to Figure 5.2), the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP as part of the energy mix of the county. Therefore, this alternative will not be considered further in this report.

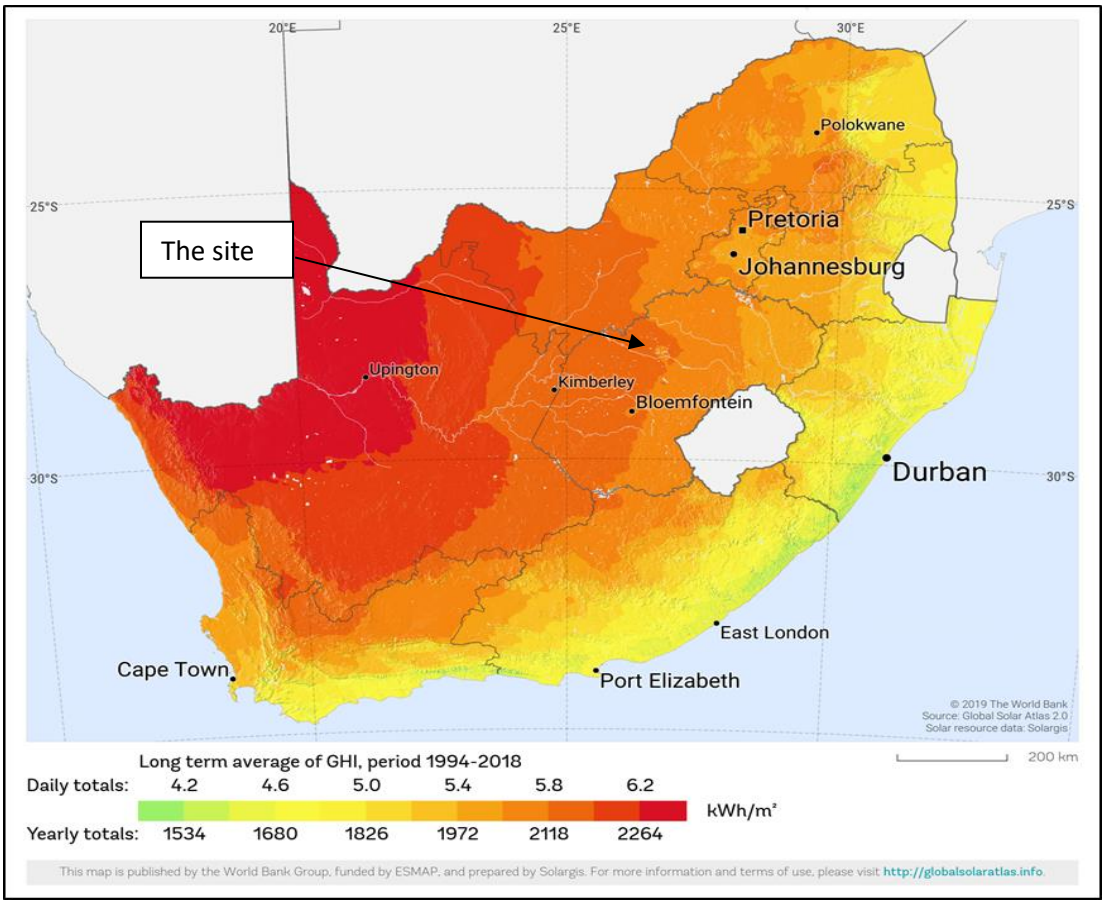


Figure 5.2: Global horizontal irradiation values for South Africa (Solar GIS, 2021) and the Mooiwater Solar PV1 Project development footprint

5.1.4 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 the technical constraints as a part of the Amended Draft Basic Assessment Report. The amended draft layout plan is included as Figure M1 and in Figure 5.2 below.

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

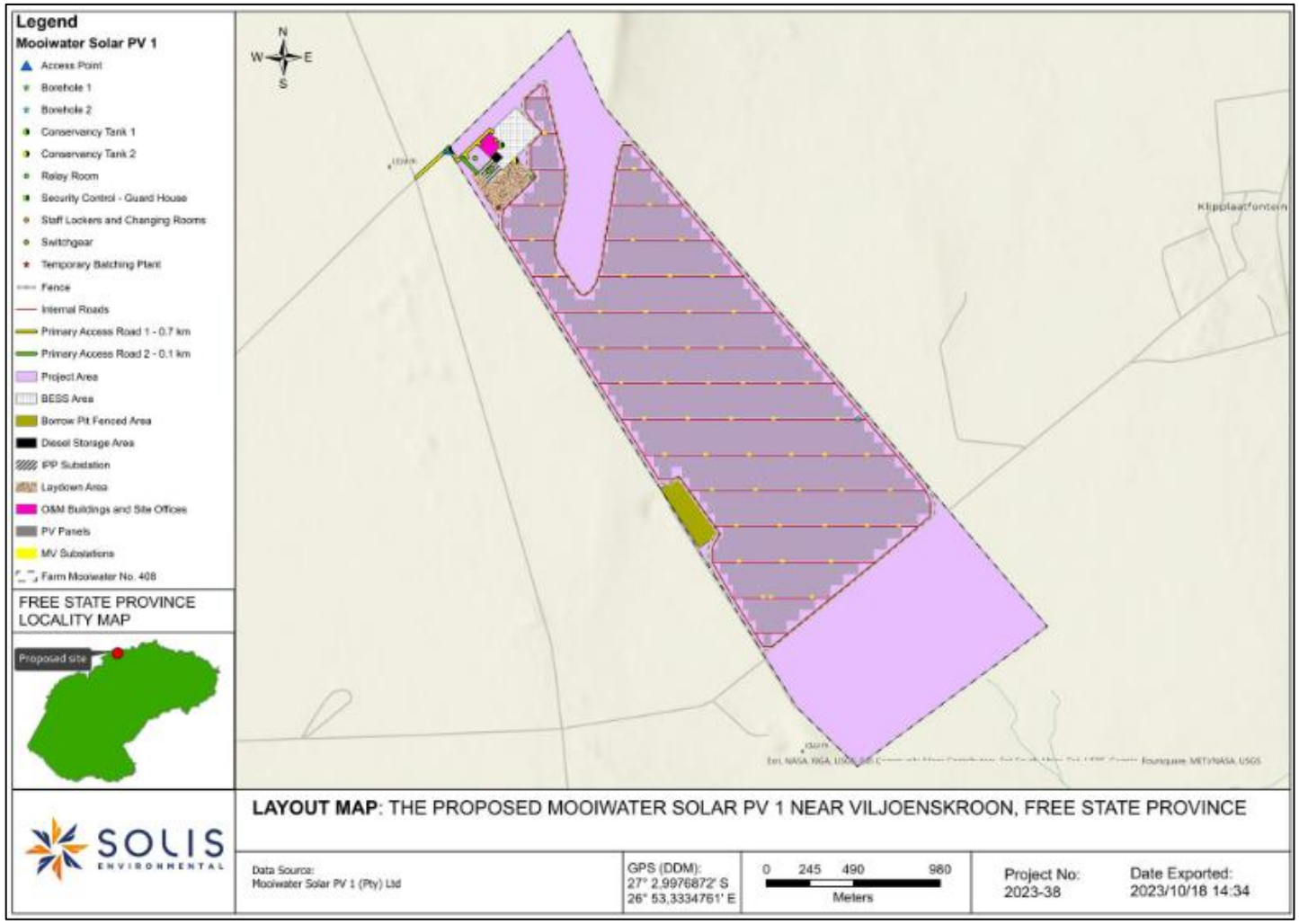


Figure 5.3: Draft layout plan for the Mooiwater Solar PV1

Technology Alternatives

Battery Energy Storage Facility (BESS):

It is proposed that a nominal up to 2500 MWh Battery Storage Facility for grid storage would be housed in stacked containers, or multi-storey building, with a maximum height of 5m with associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. The preferred battery technology is Lithium-ion. The assessment of the impacts and risks associated with the BESS is be included in the BAR in section 6 below. The preferred battery technology is transported preassembled on site and does not trigger a listing notice and does not require a high-level risk impact assessment.

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.

PV Panels:

With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.

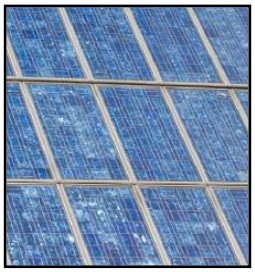
There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon and thin film. These technologies are discussed in more detail below:

- Crystalline (high efficiency technology at higher cost):

  Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating 1 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.



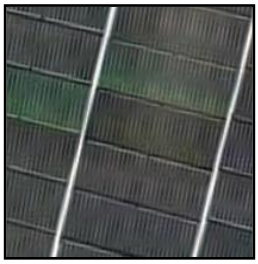
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than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

- <u>Thin film (low-cost technology with lower efficiency):</u>

  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 5.4 for an illustration of Bifacial versus Monoficial Solar Panel absorption.

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.

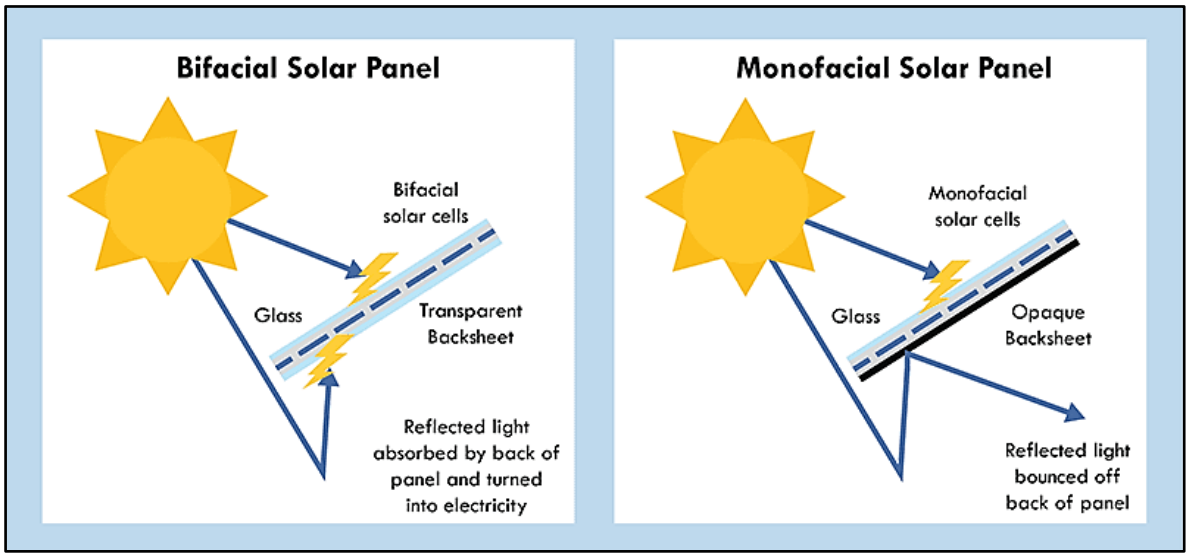


Figure 5.4: Bifacial vs Monoficial Solar Panel absorption.

Design alternatives will be considered throughout the planning and design phase and specialist studies are expected to inform the final layout of the proposed development.

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 following three categories of variables were taken into account when deciding the required level of public participation:

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

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

- Site notices
  Site notices (size 60cm x 42cm) were placed on site in Sesotho, Afrikaans and English on 6 July 2023 to inform surrounding communities and immediately adjacent landowners of the proposed development and the commencement of the BA process. I&APs were given the opportunity to raise comments by 4 August 2023. Photographic evidence of the site notices is included in Appendix E2.
- Newspaper advertisement

An advertisement was placed in English in the Klerksdorp Record Local Newspaper on 20 July 2023 (see Appendix E1) notifying the public of the BA process and the proposed application for Environmental Authorisation. The advertisement invited Interested and Affected Parties (I&APs) to register on the project I&AP database and submit any comments to Solis-Environmental Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement (i.e., up until 21 August 2023). 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.

- Background Information Document (BID)

  The release of a BID providing information on the proposed development, which invited Interested and Affected Parties (I&APs) to register on the project's I&AP database was sent to the identified I&APs, including the adjacent landowners, key stakeholders and relevant organs of state on 13 July 2023.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, were directly informed of the BA process on 13 July 2023 via registered post, teleph1 calls, WhatsApp's and emails (as relevant). The BID was distributed with the notification. For a complete list of I&APs with their contact details see Appendix E3 to this report. It was expected from I&APs to provide their inputs and comments by 14 August 2023.

- 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 13 July 2023. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix E3.

- Circulation of Draft Basic Assessment Report

  Copies of the draft Basic Assessment report were provided to all I&APs via courier, Dropbox and/or email (as relevant). Hard copies of the report were made available on request and where an I&AP did not have the resources to view the report on an online platform. I&AP's and organs of state were requested to provide their comments on the report between 1 September to 3 October 2023. The comments were documented and compiled into a Comments and Response Report to be included as part of the Amended Basic Assessment Report.

- Circulation of Amended Draft Basic Assessment Report

  In light of additional impacts and mitigation measures identified during the BA process an Amended BAR was published. The registered I&APs were notified of the availability of the Amended draft BAR at the commencement of the 30-day review and comment period. This included the details of where the report can be accessed. They were requested to provide their comments on the report within 30 days (20 October – 20 November 2023). All issues that have been identified, raised and recorded has been documented and compiled into a Comments and Responses Report (Appendix C7) and included as part of this Amended Draft Basic Assessment

Report. These will also be included as part of the Final Basic Assessment Report to be submitted to the DFFE.

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 E4 and E5. Refer to Figure 5.5 for the location of the surrounding landowners.

5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) "*A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the prop1nt 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 Amended Draft Basic Assessment Report which was made available to all potential and/or registered I&APs and State Departments. They were provided with a copy of the Draft Basic Assessment Report and were requested to provide written comments on the report within 30 days. All issues identified during the review period were documented and compiled into a Comments and Response Report to be included as part of the Amended Basic Assessment report as Appendix C7.

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

5.2.4 Issues Raised by I&APs and Consultation Bodies

To date comments have been received and are captured and responded to in the Comments and Response Report included in Appendix E6. The full wording and original correspondence is included in Appendix C4 and Appendix C5.

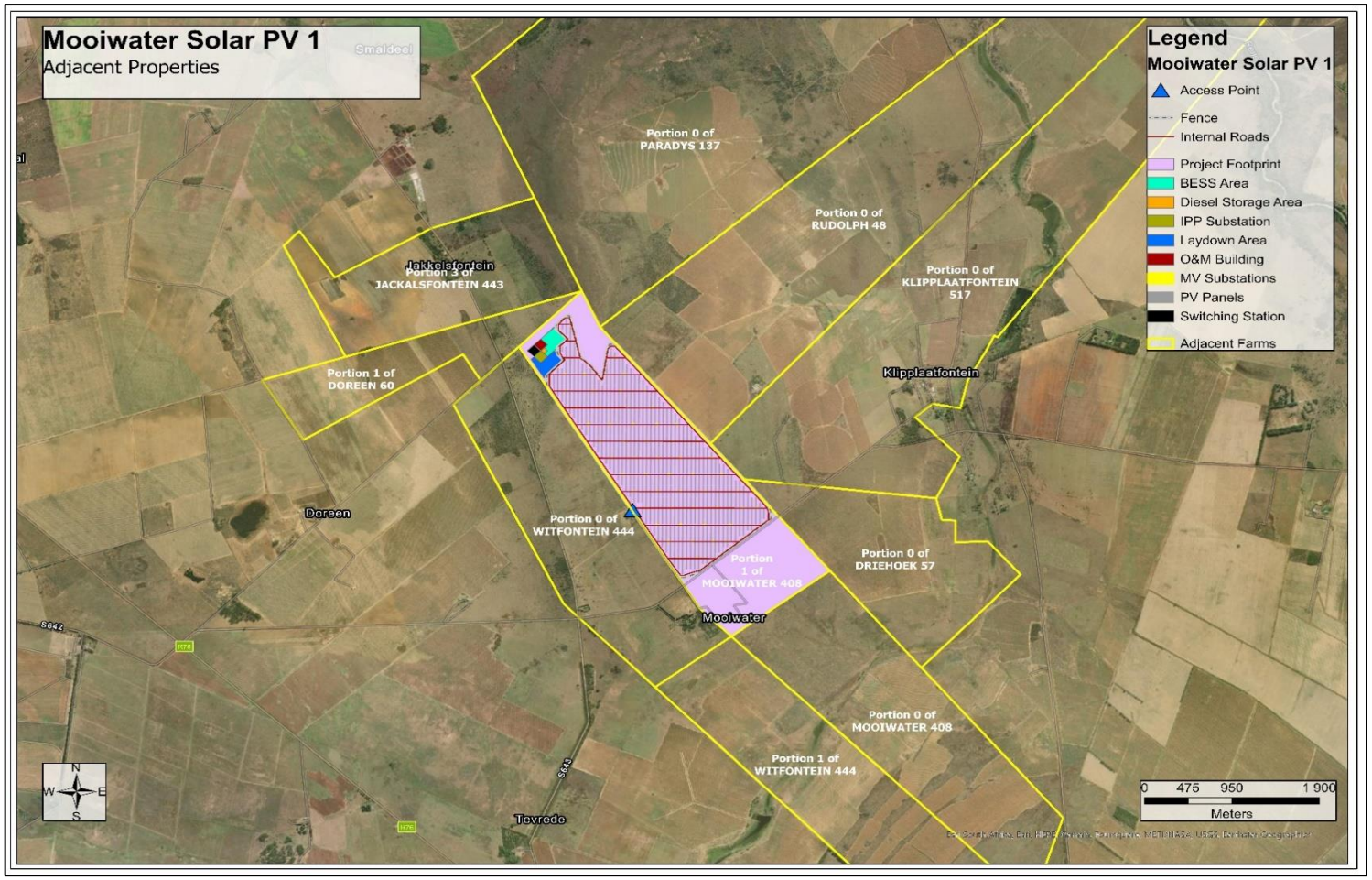


Figure 5.5: Affected property (Purple) in relation to surrounding landowners

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 development footprint within the affected property).

5.3.1 Biophysical Environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to Table 1.1.

Nevertheless, as the designated development area (referred to as the development footprint) is entirely composed of land dedicated to agricultural pursuits, and the developer has conscientiously steered clear of sensitive zones to the best extent possible, it is anticipated that no environmentally delicate regions or elements will be impacted. A comprehensive examination of the environmental attributes and qualities found on the site is provided in the subsequent discussion.

5.3.1.1 Agricultural Potential

A Site Sensitivity Verification and Agricultural Compliance Statement (attached as Appendix E1) was undertaken for the Mooiwater Solar PV Project site. The report addresses the agricultural production potential of the project site. The site is located on slopes of low ridge lines and mid-slops and foot-slopes with slope gradient percentages of 0-3%. The dominate soils are very shallow to deep, medium to heavy textured soils, predominantly on underlying rock of predominantly Diabase and Hekpoort lava, shale, slate and quartzite of the Pretoria Group. The dominate soils are Mispah, Glenrosa and Hutton occur around the site.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the site is characterised by the Bc25 land type. This land type is generally moderately deep to deep (>500 mm), loamy fine sand to loam overlying loam associated with very shallow soils and rock outcrops. The site falls within an area that is classified as a Protected Agricultural Area. However, there may be much variation within a Protected Agricultural Area and all land within it is not necessarily of sufficient agricultural potential to be suitable for crop production, due to site-specific terrain, soil, and other constraints. The proposed facility footprint has been laid out to specifically avoid all viable cropland areas and only utilise those parts of the farms that are not suitable for cropland.

The classification of certain areas in Figure 5.6, of the DFFE Screening Tool Report (Appendix B), as having high agricultural sensitivity (highlighted in red) is due to their categorization as cropland in the utilized dataset for the screening tool. However, this dataset is outdated. All the land within the area in question is no longer utilized for cropping and has remained uncropped for the past decade, as evidenced by historical imagery from Google Earth. Consequently, designating this land as cropland and assigning it high sensitivity is inappropriate. This evaluation challenges the screening tool's high sensitivity label, which is based on cropping status.

The assessed land capability within the area ranges from 5 to 8. This evaluation contradicts the designated land capability of 8 based on the report's assessment of the site's cropping potential (refer to the subsequent section) and confirms a maximum land capability of 7 (unsuitable for rain-fed cropping). Consequently, this evaluation establishes the entire assessed area as having medium agricultural sensitivity.

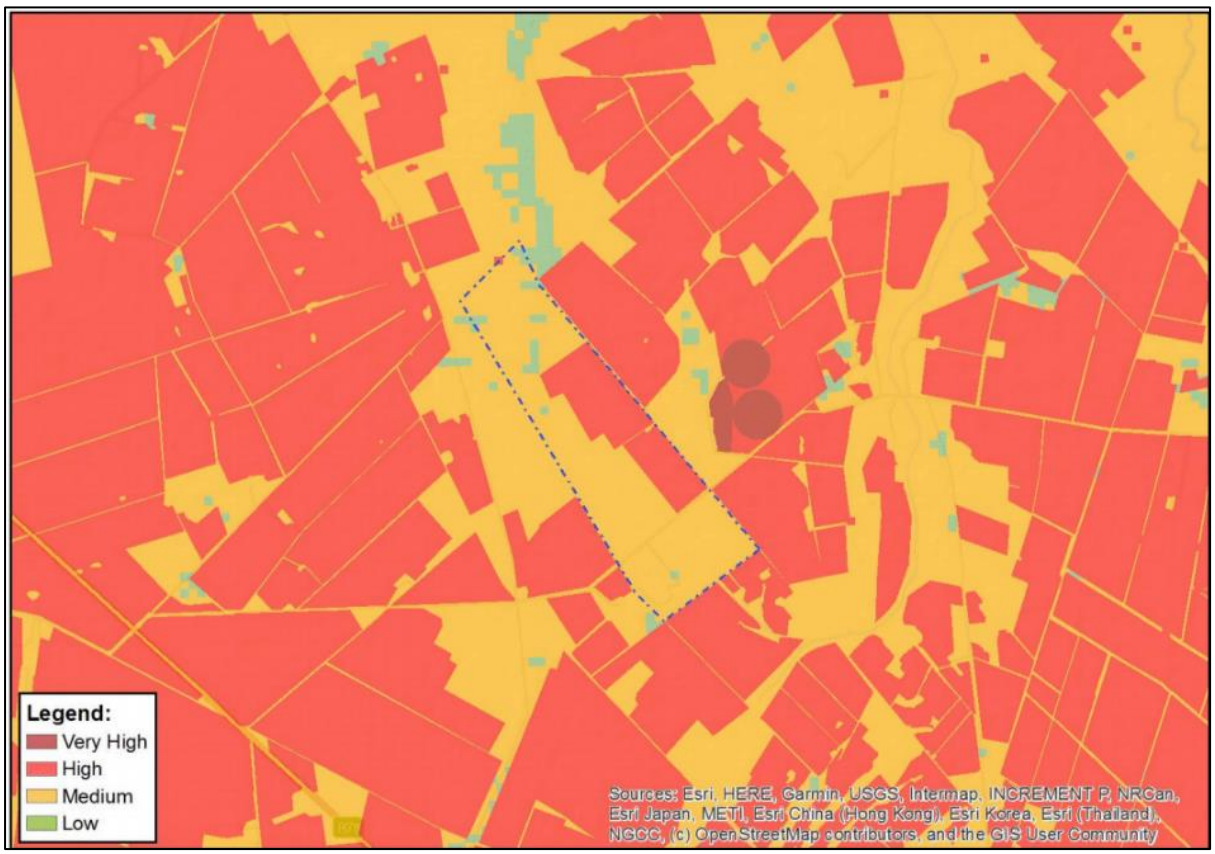


Figure 5.6: Agricultural sensitivity as identified by the DFFE Screening Tool.

5.3.1.2 Terrestrial Biodiversity

An impact assessment (attached as Appendix E2) was undertaken for the proposed project which discusses the vegetation, topography as well as the landscape features identified within the project area. The Mooiwater Solar PV is situated within the Vaal-Vet Sandy Grassland Bioregion. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). The area occurs on a plains-dominated landscape with some scattered, slightly irregular undulating plains and hills (Mucina & Rutherford, 2006). With regards to the plant types, the area consists mainly of low-tussock grasslands with an abundant karroid element (Mucina & Rutherford, 2006). This bioregion mainly occurs in the North-West and Free State Provinces at altitudes of 1 260 to 1 360 m (Mucina & Rutherford, 2006). The Rand Highveld Grassland occurs on highly variable landscapes with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The vegetation is species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. This vegetation type can be found in

Gauteng, North-West, Free State and Mpumalanga Provinces, between rocky ridges from Pretoria to Witbank, extending onto ridges in the Stoffberg and Roossenekal regions as well as west of Krugersdorp centred in the vicinity of Derby and Potchefstroom, extending southwards and north-eastwards from there (Mucina & Rutherford, 2006). Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

According to Mucina and Rutherford (2006), this vegetation type is classified as Endangered. The national target for conservation protection for both these vegetation types is 24%, but only a few patches are protected in statutory reserves (Kwaggavoetpad, Van Riebeeck Park, Bronkhorstspruit, Boskop Dam Nature Reserves) and in private conservation areas (e.g. Doornkop, Zemvelo, Rhenosterpoort and Mpopomeni). Almost half of this vegetation type has been transformed mostly by cultivation, plantations, urbanisation or dam-building. Cultivation may also have had an impact on an additional portion of the surface area of the unit where old lands are currently classified as grasslands in land-cover classifications and poor land management has led to degradation of significant portions of the remainder of this unit (refer to Figure 5.7).

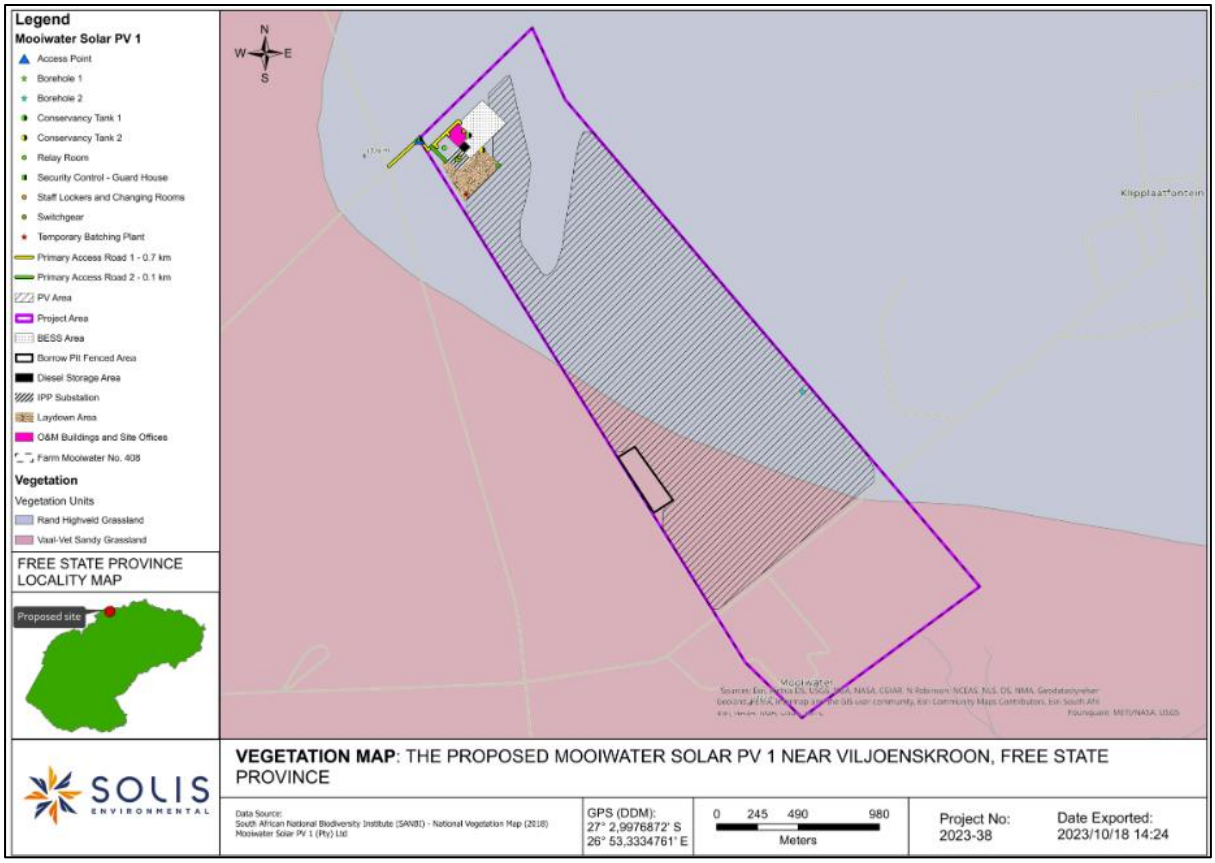


Figure 5.7: Map illustrating the vegetation types associated with the Mooiwater Solar PV1

Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR),

Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project site overlaps an EN ecosystem as per Figure 5.8 below.

Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within 1 or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed PROJECT AREA overlaps with a PP ecosystem as per Figure 5.9 below.

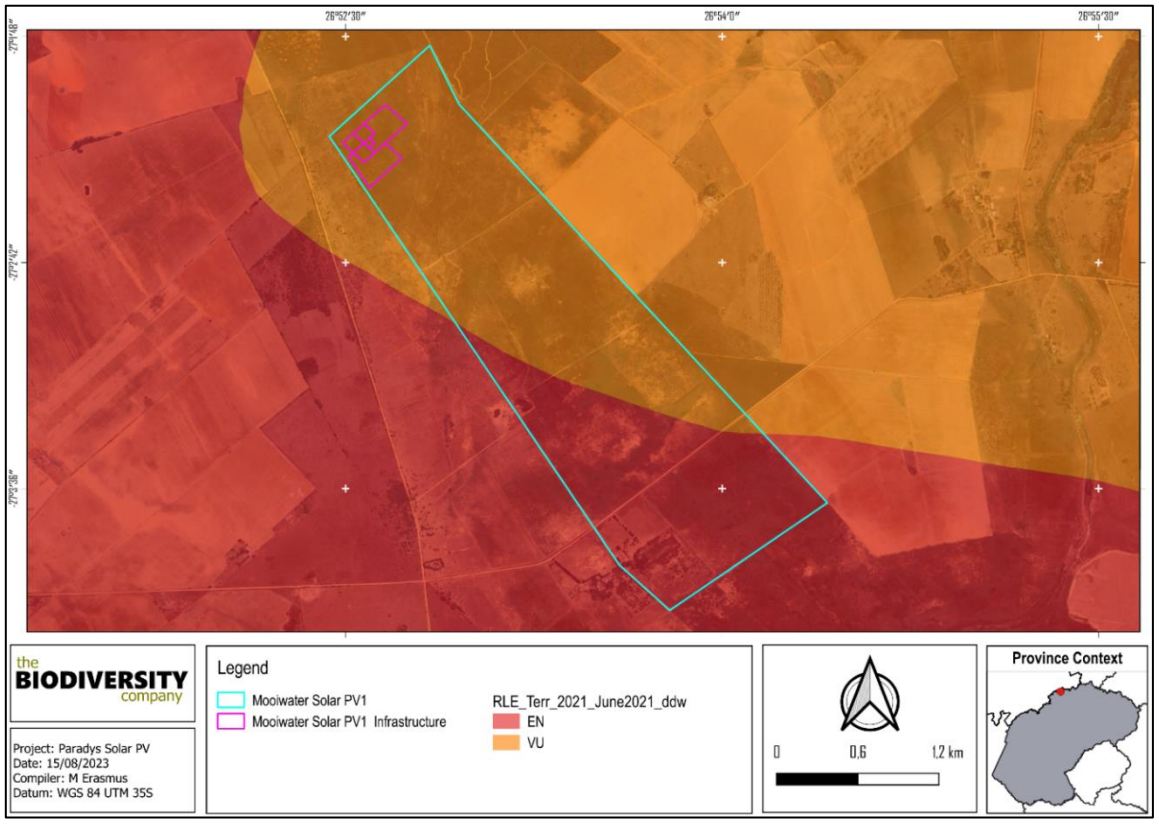


Figure 5.8: Map illustrating the ecosystem threat status associated with the Mooiwater Solar PV1

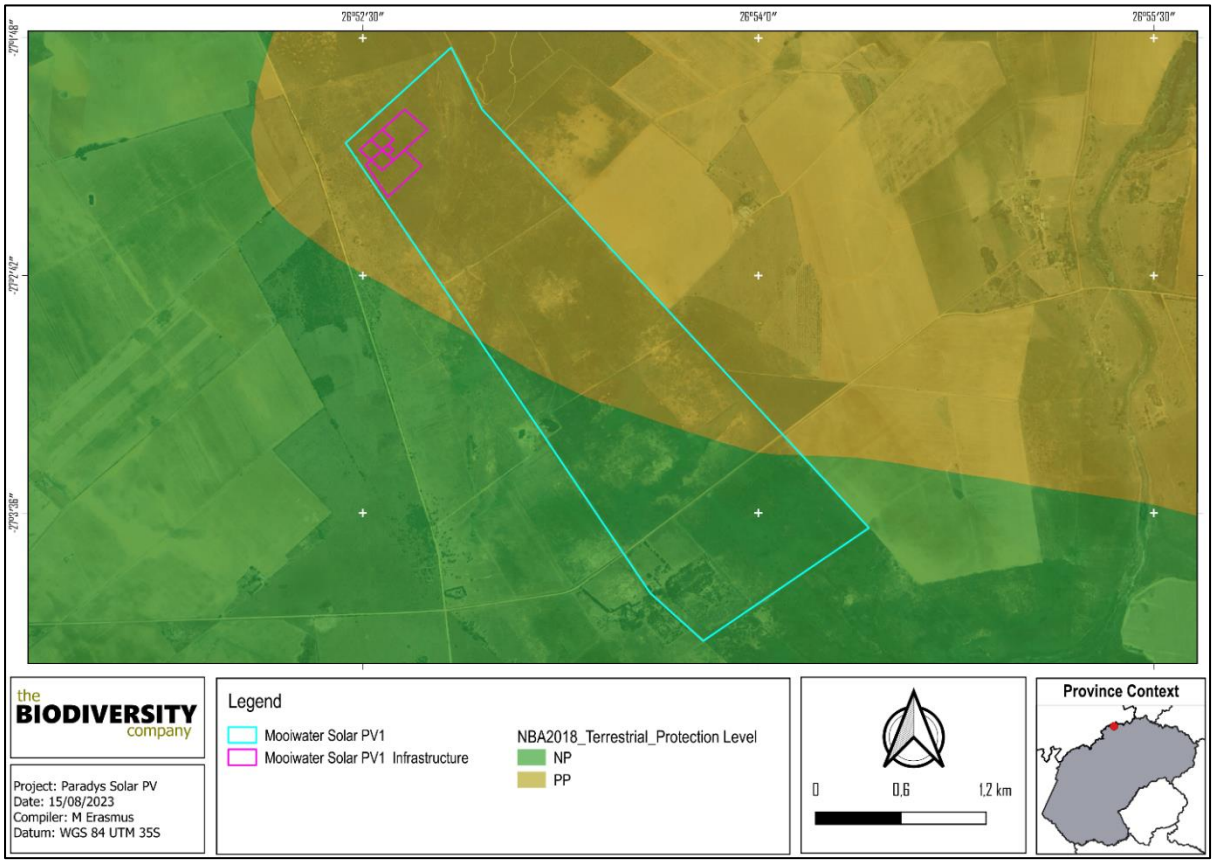


Figure 5.9: Map illustrating the ecosystem protection level associated with the Mooiwater Solar PV1

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

The Free State Province Biodiversity Plan classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole.

- CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).
- ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and

associated land management objectives or outcomes. The highest categorisation level is often referred to as a CBA1 'Irreplaceable Critical Biodiversity Area' which usually represents pristine natural habitat that is very important for conservation. Figure N shows the project area superimposed on the conservation plan. The project area overlaps with areas predominantly classified as Other Natural Areas and Degraded Areas. Notable areas classified as CBA 1 are also located within the project area.

The South Africa Protected Areas Database (SAPAD) contains spatial data pertinent to the conservation of South African biodiversity. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003. According to the protected area spatial datasets from SAPAD (2022) and SACAD (2022), the project area does not occur within 50 km of a protected area as per Figure 5.10 below. A small portion of the site falls within a CBA1 in the northeastern corner. This area is already highly disturbed and degraded and falls within a medium sensitivity. The Specialist denotes that only areas with a high to very high sensitivity should adhere to avoidance as a mitigation which has been applied in the proposed amended draft layout. As the CBA1 area of the project site is considered degraded and falls within a medium sensitivity, avoidance therefore is not recommended. **Complete clearance is not recommended**, however, therefore the development area located in the CBA1 should adhere to the maintenance of basal vegetation cover beneath the solar panels.

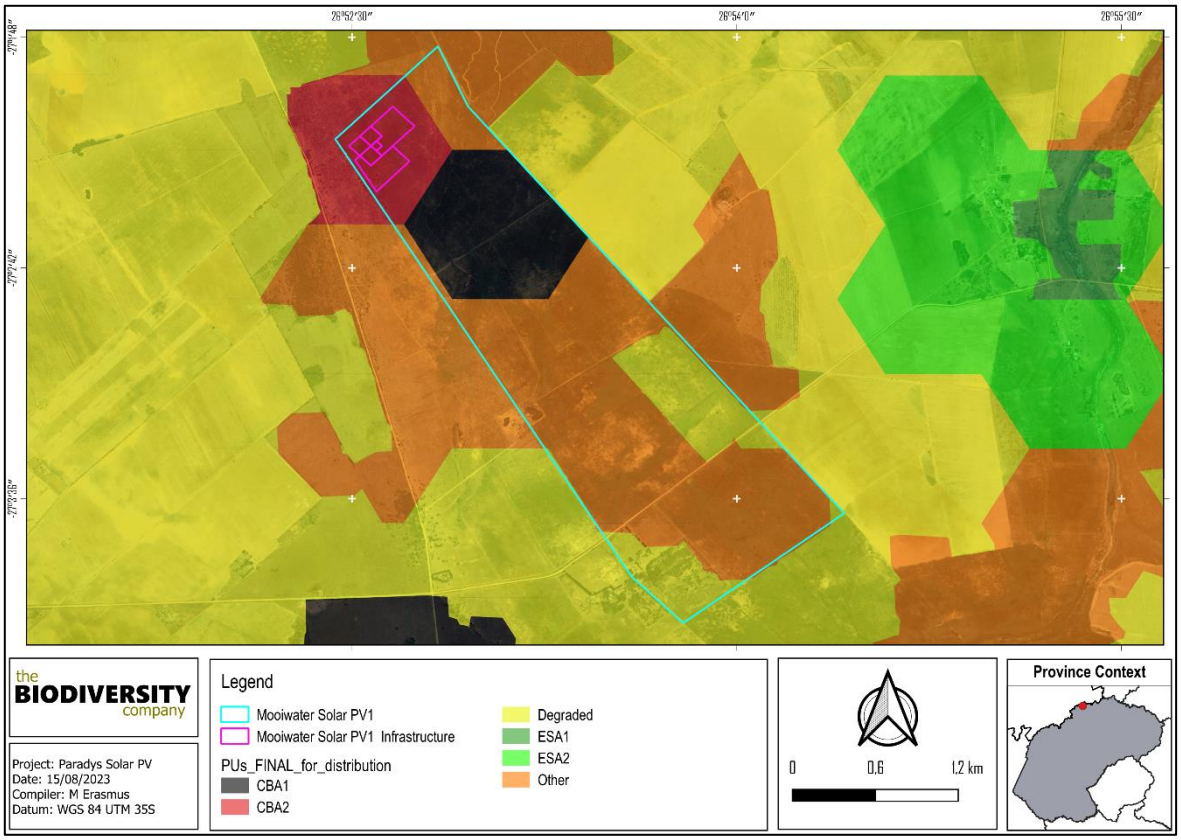


Figure 5.10: Map illustrating the locations of the Mooiwater Solar PV1 in relation to the CBA Map

National Protected Area Expansion Strategy

National Protected Areas Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore, of high importance for biodiversity, climate resilience and freshwater protection.

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

Renewable Energy Development Zones (REDZ)

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of large-scale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments. The spatial dataset indicated that the project area overlaps with the Phase 2 Klerksdorp REDz, refer to Figure 5.11.

Figure 5.11: The Project Area in relation to the REDz

Renewable Energy Database

The Renewable Energy Database (http://egis.environment.gov.za/), shows that there are 8 other projects in the near vicinity (30 km) (Figure 5.12). This increases the overall impact on the habitats in the area.

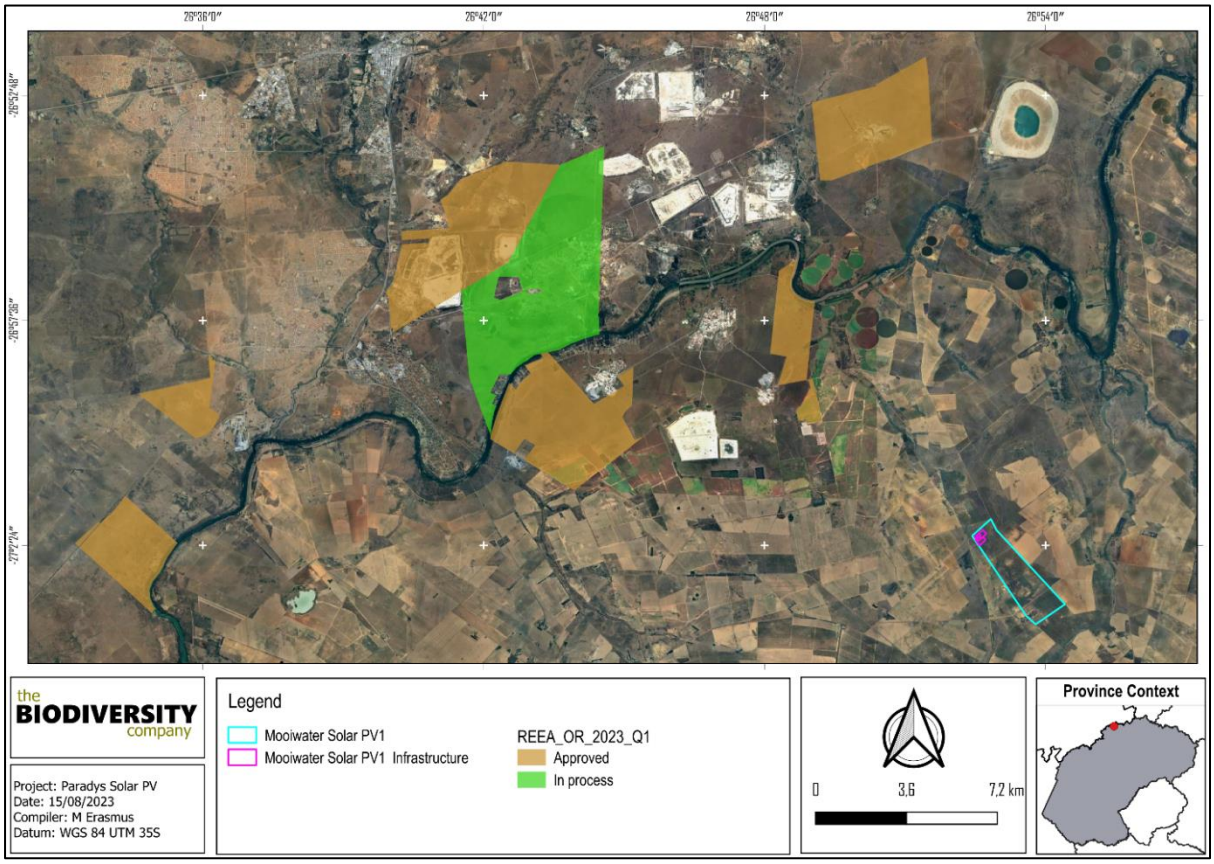


Figure 5.12: The project area in relation to the renewable energy database projects in the area.

Strategic Transmission Corridors

On the 16 February 2018 minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

Figure 5.13 shows the project overlaps with the Central EGI corridor.

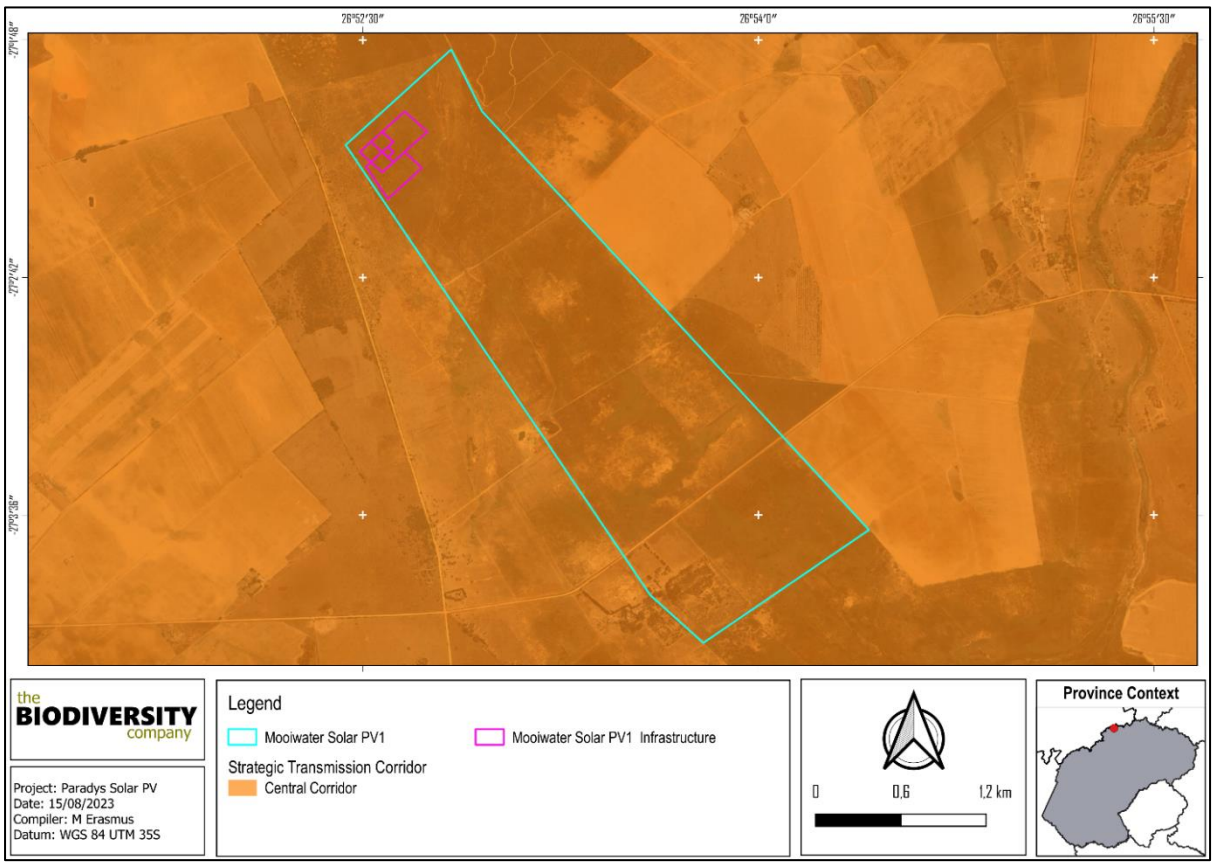


Figure 5.13: The project area in relation to the strategic transmission corridors.

Flora Assessment

Two main vegetation types were identified in the project area, Indigenous Flora and Invasive Alien Plants (IAPs).

Vaal-Vet Sandy Grassland:

The Vaal-Vet Sandy Grassland occurs on a plains-dominated landscape with some scattered, slightly irregular undulating plains and hills (Mucina & Rutherford, 2006). In terms of plant types, it consists mainly of low-tussock grasslands with an abundant karroid element (Mucina & Rutherford, 2006). It occurs in the North-West and Free State Provinces at altitudes of 1 260 to 1 360 m (Mucina & Rutherford, 2006). This vegetation is classified as EN, with a conservation target of 24% (Mucina & Rutherford, 2006).

Rand Highveld Grassland:

This vegetation type occurs on highly variable landscapes with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The vegetation is species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. This vegetation type can be found in Gauteng, North-West, Free State and Mpumalanga Provinces, between rocky ridges from Pretoria to Witbank, extending onto ridges in the Stoffberg and Roossenekal regions as well as west of Krugersdorp centred in the vicinity of Derby and Potchefstroom, extending southwards

and north-eastwards from there (Mucina & Rutherford, 2006). This vegetation type is classified as Endangered. The national target for conservation protection for both these vegetation types is 24%.

Almost half of this vegetation type has been transformed mostly by cultivation, plantations, urbanisation or dam-building. Cultivation may also have had an impact on an additional portion of the surface area of the unit where old lands are currently classified as grasslands in land-cover classifications and poor land management has led to degradation of significant portions of the remainder of this unit.

The vegetation assessment was conducted throughout the extent of the project area. A total of 87 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment refer to the specialist report (Appendix E2) for the list of species.

The project area also contained IAPs. IAPs tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species. During the site inspection nineteen (19) IAP species were recorded within the PAOI. These species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b and Not Indigenous (Exotic) respectively. Of these IAPs identified, ten (10) species are IAP species that must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above. Refer to the specialist report (Appendix E2) for the list of species.

Faunal Assessment

According to the field assessment conducted by the Biodiversity Company (2023), there are 17 amphibian species are expected to occur within the area (Appendix B). One of these species are regarded as SCC see table 5.1 below.

Table 5.1 Threatened amphibian species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional	Global	
Pyxicephalus adspersus	Giant Bull Frog	NT	LC	Moderate

The Giant Bull Frog (*Pyxicephalus adspersus*) is a species of conservation concern that will possibly occur in the project area. The Giant Bull Frog is listed as NT on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2023). Due to the presence of suitable habitat in the project area the likelihood of occurrence is rated as moderate.

Reptiles

Based on the IUCN Red List Spatial Data and the Reptile MAP database, 38 reptile species are expected to occur within the area (Appendix C). None are regarded as threatened.

Mammals

The IUCN Red List Spatial Data lists 81 mammal species that could be expected to occur within the area (Appendix D). This list excludes large mammal species that are limited to protected areas. Twelve of these expected species are regarded as threatened (Table 5.2), six of these have a low likelihood of occurrence based on the lack of suitable habitat and the level of disturbance nearby to the project area.

Table 5.2 Threatened mammal species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional	IUCN	
Aonyx capensis	Cape Clawless Otter	NT	NT	Confirmed
Atelerix frontalis	South African Hedgehog	NT	LC	Moderate
Crocidura maquassiensis	Makwassie Musk Shrew	VU	LC	Low
Eidolon helvum	African Straw-coloured Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Moderate
Leptailurus serval	Serval	NT	LC	Confirmed
Mystromys albicaudatus	White-tailed Rat	VU	EN	Low
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Confirmed
Poecilogale albinucha	African Striped Weasel	NT	LC	Low

Site Ecological Importance (SEI)

Based on the assessment and field investigation, two (2) main terrestrial habitat types with associated seepage wetlands (water resources) were delineated within the Mooiwater Solar PV project area. The habitats within the assessment area of the proposed project were allocated a sensitivity category as illustrated in Figure 5.14 below. The project area comprises transformed areas and areas of indigenous vegetation. It supports several indigenous fauna and flora species, including Species of Conservation Concern (SCC). A High Sensitivity value was given to the Secondary Grassland, with a moderate sensitivity for the wetland area and low sensitivity for the Transformed/ Agricultural fields.

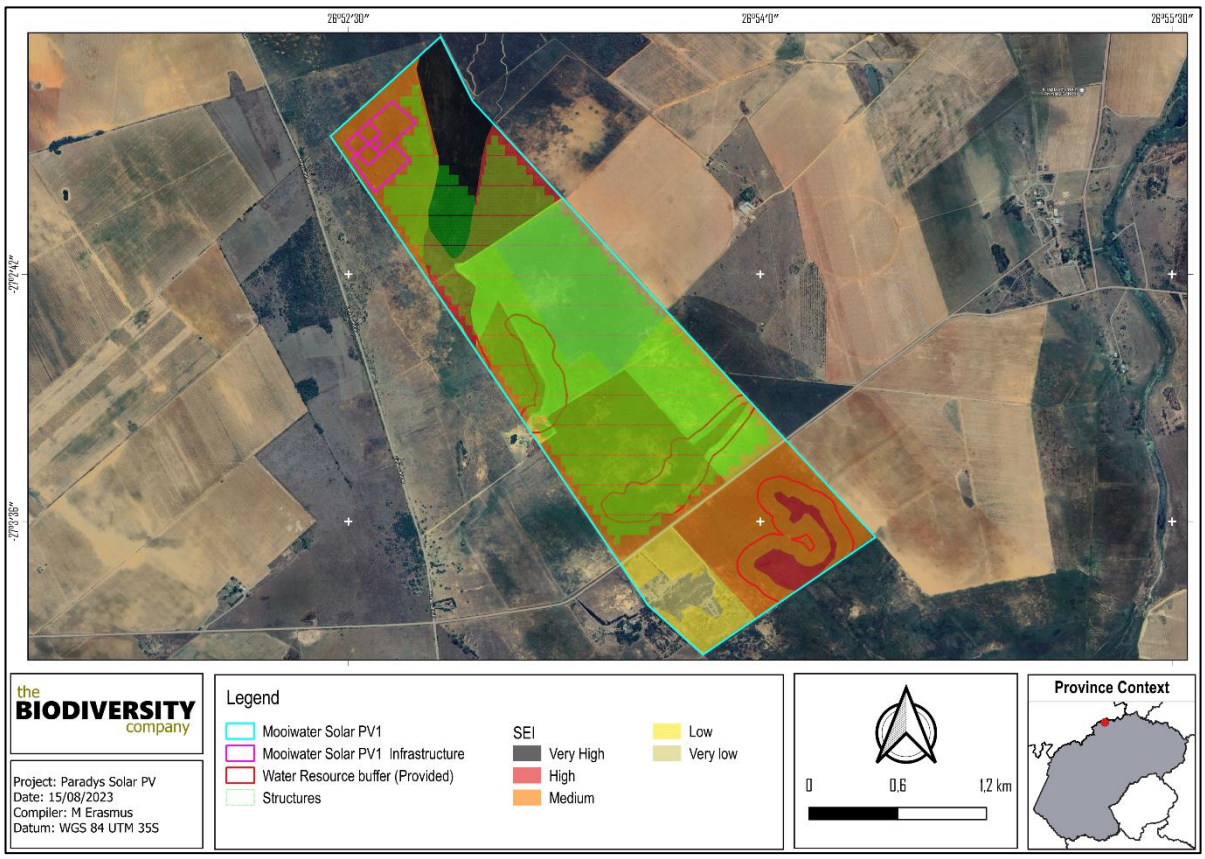


Figure 5.14: Map illustrating the ecological sensitivity of the Mooiwater Solar PV Project area

When comparing this with the National Environmental Screening Tool the terrestrial biodiversity assessment led to partially disputing of the 'Very High' classification for the terrestrial biodiversity theme sensitivity. The project area is instead assigned a sensitivity of 'Very Low' for all transformed areas, and only secondary grassland a sensitivity of 'High', primarily due to the presence of SCC, small mammal and avifauna, refer to Table 5.3 below.

Table 5.3: Summary of the screening tool vs the specialist's assigned sensitivity

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	**Medium**	**Medium**	Validated – Certain habitats are generally intact, and SCC were recorded. SCC may forage in specific areas.
Plant Theme	**Medium**	**Medium**	Validated - The composition, high species diversity and number of plant species recorded.
Terrestrial Theme	**Very High**	**Very Low-Very High**	Disputed – Certain habitat sensitivities are regarded as very high/high sensitivity due to the role of this intact habitat to biodiversity within an area being more fragmented locally, this is however not for the entire PAOI.

According to the Biodiversity Company (2023) the ecological integrity, importance and functioning of the High sensitive areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of these habitats is the most important aspect to consider for the proposed project and must therefore be protected.

When considering the possible impacts the Mooiwater Solar PV Project will have on the terrestrial biodiversity, the following main impacts are expected for a more detailed list of the proposed impacts:

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

There are areas within the PAOI that possess a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. The maintenance of basal vegetation cover beneath the solar panels will contribute to achieving avoidance, so complete clearance is not recommended. Project planning and layout considered provides favourable avoidance mitigation. The overall low cumulative residual impact does not present a fatal flaw for the development, and in accordance with the Biodiversity Offset Guideline (2022) will not incur a listed (and notable) change to the land and resource.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project.

5.3.1.3 Wetlands, Aquatic and Riparian Features

According to the Wetland and Aquatic Biodiveristy Impact Assessment (Appendix E3) the wider area falls within the within the Middle Vaal Management Area (Quaternary Catchments C70K). A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of the river and inland wetland ecosystem types as well as pressures on these systems. Strategic Water Source Areas (SWSAs) are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing. National Freshwater Ecosystem Priority Area (NFEPA) database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

The Ecosystem Threat Status (ETS) of river and wetland ecosystem types are based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Concern (LC), with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer et al., 2019; Skowno et al., 2019).

The wider study area is relatively flat, with the low hill of Paradyskop occurring within the site. The general drainage on the site is towards the Olifantsvlei and Renoster Rivers to the east, as well as the

Vaal River to the north. Table 5.4 below provides an overview of the aquatic resources associated with the proposed site.

Table 5.4: Key water resources information for the proposed project development area

Descriptor	Name / details	Notes
Water Management Area	Middle Vaal	
Catchment Area	Vaal River	Tributary - Orange River
Quaternary Catchment	C70K (Renoster and Olifantsvlei Rivers)	
Present Ecological state	Renoster (C70K): Moderately modified (C Category) Olifantsvlei (C70K): Largely modified (D Category)	DWS (2014) rapid PES and EI&ES assessments
Ecological Importance (EI) and Ecological Sensitivity (ES)	Renoster (C70K): EI: High; ES: High Olifantsvlei: EI: Moderate; ES: Moderate	
Target Ecological Category	Renoster (C70K): Moderately modified (C Category)	DWS (2014) RQOs
Location of the centre of site	27° 2'55"S	Latitude
	26°53'15"E	Longitude

5.1.1.1 Climate, Geology and Geohydrology

Within the study area, average temperatures vary from 9.3˚C in June/July to 22.4˚C in January and February. The wet season occurs from October to mid-April, with February tending to be the wettest month and July the driest month. The mean annual rainfall for the area is 510mm, with the highest rainfall month on average being January (74mm) and the lowest, June/July (0mm). Except for the larger rivers (Vaal, Renoster and Olifantsvlei Rivers that are off-site) the aquatic features in the area are non-perennial. These non-perennialor seasonal aquatic features are thus only inundated in summer during the rainfall period. A minor intergranular and fractured aquatic occurs in the area that has low yields of less than 0.5 l/s. The groundwater table is generally about 22 m below ground level. The water quality is relatively poor, with electrical conductivities of between 150 and 370 mS/m. The aquifer has a medium to high susceptibility to contamination from anthropogenic activities. The site is not in a Strategic Water Source Area for surface or groundwater.

Aquatic Habitats, Biota, Biodiversity Sensitivity and Conservation Importance

The freshwater features in the wider study area consist primarily of Vaal, Renoster and Olifantsvlei Rivers, as well as valley bottom wetlands, seeps and depression wetland areas. The Olifantsvlei River arises near Viljoenskroon while the larger Renoster River originates near Edenville, further to the south-east of the site. Both rivers drain northwards to join the Vaal River approximately 7 km north-east of the site. The watercourses and wetland areas are relatively disturbed and are in general surrounded and impacted by agricultural activities. The seasonal wetlands have however been more significantly impacted by agricultural activities which have extended into most of the wetlands and only avoided the more significant wetland areas. Where the wetlands have been avoided, they still comprise mostly indigenous moist grassland vegetation with localised invasions of alien plants where there has been more disturbance. A more detailed assessment of aquatic features can be found in the

Wetland and Aquatic specialist report (refer to Appendix E3). The study area has an overall Low aquatic biodiversity combined sensitivity. There are no areas of Very high sensitivity for aquatic biodiversity combined sensitivity within the site.

In the National FEPA mapping, the catchment at the site is not considered to be a Freshwater Priority Area River sub-catchment. A small depression wetland is mapped within the site as an artificial FEPA wetland area that has been verified through the field assessment. In addition, the seep wetlands are highly modified, occurring in previously cultivated areas There are no wetlands mapped within the site in the National Wetland Map 5 (NWM5).

In terms of biodiversity conservation value that are mapped within the study area in the Free State Biodiversity Plan, there are no aquatic features of note within the study area. Most of the study area is mapped as being degraded or as 'other', with a terrestrial Critical Biodiversity Area and Ecological Support Area mapped in the north-western portion of the site. (Refer to Figure 5.16 and 5.17 to see accompanying FEPA and NWM maps and location of the low sensitivity depression and seep wetlands)

The substrate in the watercourses and wetland areas comprises a mix of sand and clayey soils. Most of the natural aquatic vegetation associated with the aquatic features has been removed and the remaining vegetation tends to be dominated by a mix of indigenous and alien grasses such as Cynodon dactylon, Imperata cylindrica, Paspalum dilatatum, Eragrostisinamoenaand Agrostis lachnantha. Seasonal wetland vegetation occurring within the wetter wetland areas in the area includes Juncus spp., Cyperus rupestris, Cyperus congestus, Mariscus congestus, Kyllinga alba, and Rorippa nasturtium-aquaticum.

The identified aquatic features on site according to the specialist are in a modified ecological condition as a result of direct habitat modification with the associated loss of indigenous vegetation. The larger watercourses near the site are more than 1.5 km from the site and are not likely to be impacted by the proposed project. All aquatic features deemed to be of a medium and high aquatic sensitivity have been designated as no-go areas and the development footprint has excluded these features from the proposed layout,

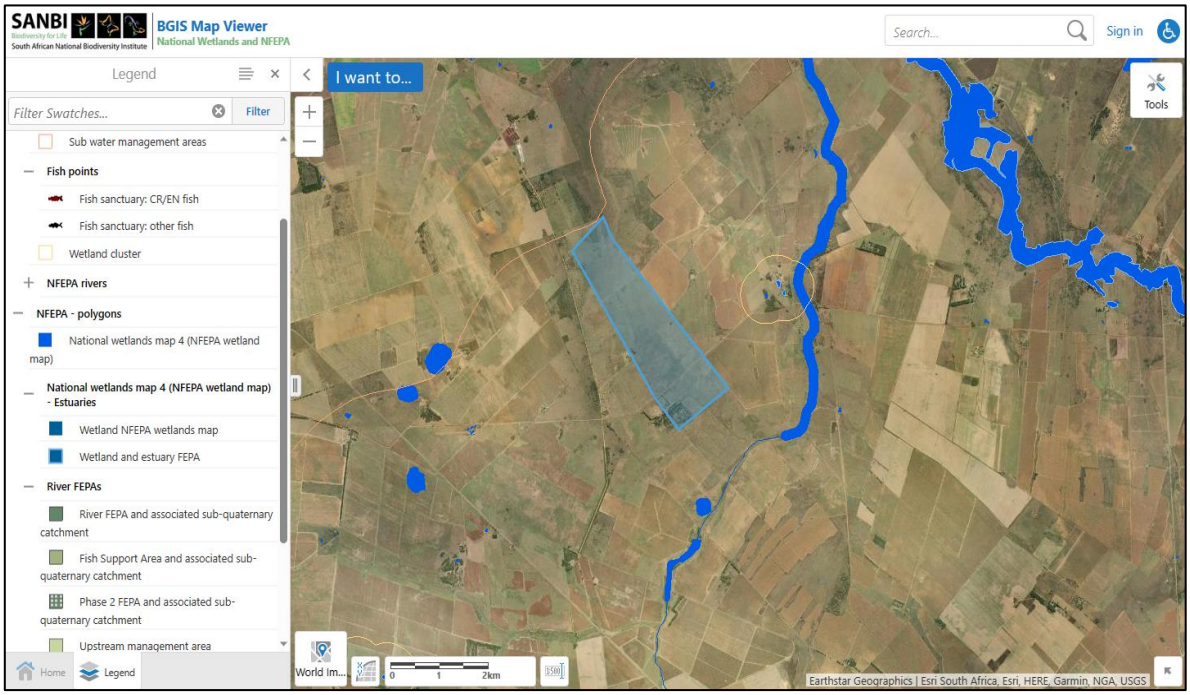


Figure 5.15: Freshwater Ecosystem Priority Areas within the wider study area (2011 CSIR National Freshwater Ecosystem Priority Areas, obtained from SANBI Biodiversity GIS, 2023)

Figure 5.16: FEPA Wetland and National Wetland Map 5 for the study area (obtained from CapeFarmMapper, 2023)

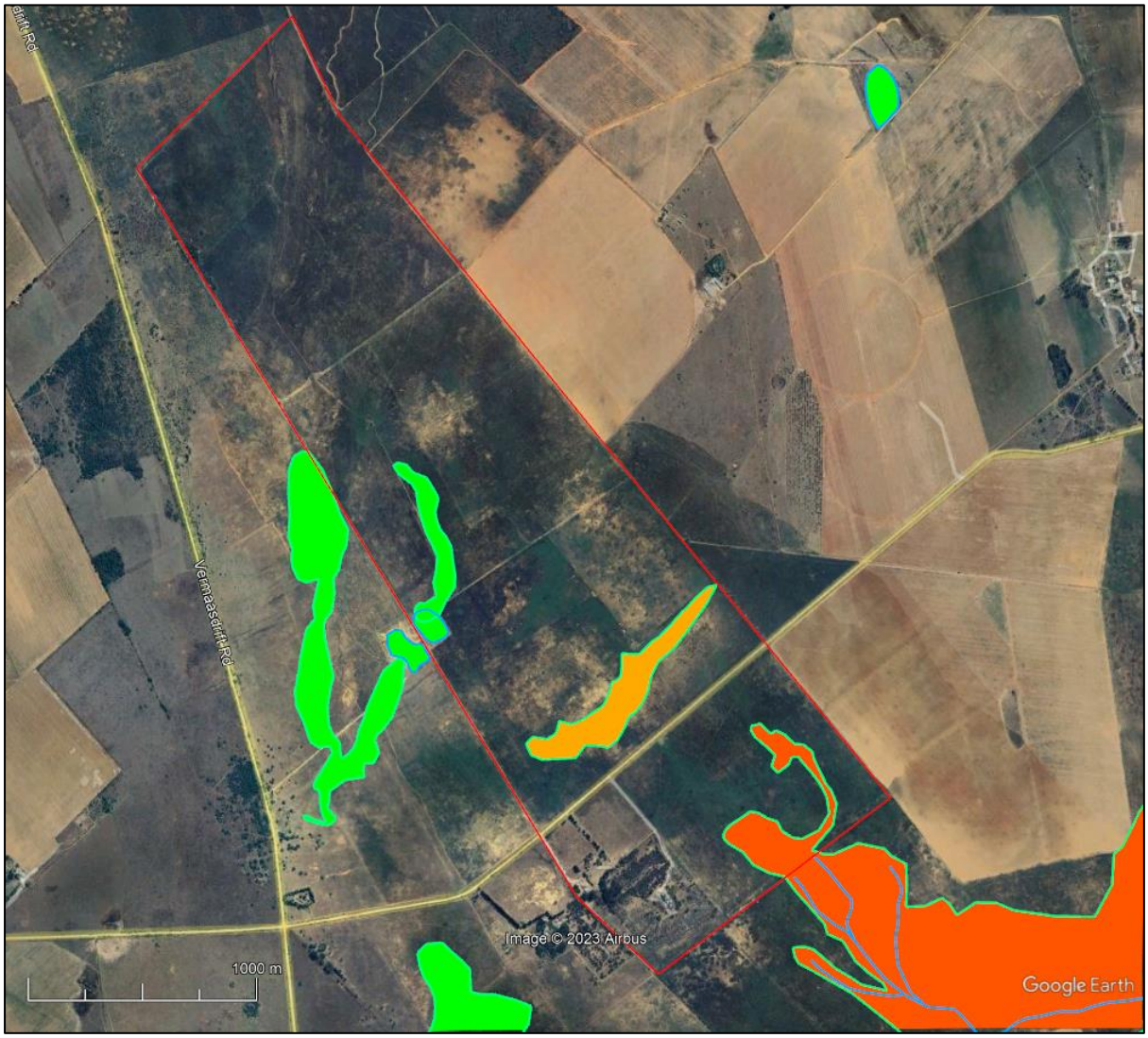


Figure 5.17: Aquatic features identified within the study area

Site Sensitivity and Impact

Based on the present ecological condition (largely to seriously modified) and ecological importance and sensitivity (moderate to low), as well as the recommended ecological condition of the watercourses (largely modified), buffers have been recommended to protect these ecosystems. The recommended buffer area between the aquatic features and the project components to ensure these aquatic ecosystems are not impacted by the proposed activities ranges between 20m and 50m from the delineated edge of the wetlands. The highly degraded (low sensitivity) wetlands within existing cultivated lands are not deemed a constraint to the proposed project as they have already been significantly modified by agricultural activities and are of low aquatic sensitivity. If the construction and operation of the PV modules do not require modification to the topography, topsoils or removal of indigenous grassland such that wetland functionality within these degraded wetland areas could be retained, the modules could be placed within the wetland areas mapped as being of low sensitivity in Figure 5.17 above.

The Wetland and Aquatic Impact Assessment has found that the larger aquatic features on-site to be of moderate sensitivity and the smaller or degraded features to be of low sensitivity. The low Aquatic Biodiversity Combined Sensitivity mapping of the screening tool differs slightly as it has not included wetland features considered to be of more aquatic ecological importance and sensitivity by the assessment. It is recommended that the proposed activities should avoid impacting the aquatic features considered of moderate sensitivity.

Most of the potential aquatic ecosystem impacts of the proposed activities are likely to take place during the construction phase. These potential impacts and the associated issues identified include:

- Disturbance of aquatic habitats within the watercourses and wetlands with the associated impacts to sensitive aquatic biota. During construction, activities within the wetlands could result in the disturbance or destruction of sensitive habitats and any listed and or protected plant or animal species. The proposed activities should thus be placed outside of the aquatic features mapped as being of moderate sensitivity as well as their recommended setback areas. No Resource Quality Objectives exist for the minor watercourse and wetlands concerned however, the proposed activities, with the recommended setback areas, are unlikely to prevent these objectives from being met.

- Any removal of indigenous wetland vegetation will reduce the ecological integrity and functionality of the watercourses and wetlands. Construction works, in particular, could result in the loss of aquatic vegetation that provides ecosystem services within the sites.

- Demand for water for construction could place stress on the existing available water resources. During construction, more water is required than during the operation phase. This water would be required for a 1–2-year period while construction works are ongoing. Given the limited water availability in the area, it is advised that water be obtained off-site for construction.

- Alien vegetation infestation within the aquatic features due to disturbance. The current presence of alien vegetation on the sites is limited. Sources of alien seed should be prevented from being brought onto the sites with imported materials. Monitoring post-construction for the growth of alien vegetation can mitigate this potential impact.

- Increased sedimentation and risks of contamination of surface water runoff during construction. During construction, the earthworks near the watercourses and wetlands will expose and mobilise soil as well as construction materials and chemicals that may end up in the wetlands. If works are undertaken during the drier periods of the year, this impact would be unlikely.

During the operational phase, potential impacts of the proposed project activities would include:

- Ongoing disturbance of aquatic features and associated vegetation adjacent to infrastructure that needs to be maintained. As for the disturbance of aquatic features described under construction impacts, the disturbance of aquatic habitat is unlikely.

- Modified runoff characteristics from hardened surfaces have the potential to result in the erosion of aquatic habitats. Limited hardening of surfaces will take place as a result of the proposed project.

- Any structures within the watercourse associated with the proposed project, such as at the road crossings must not impede flow in the watercourse.

- Water supply (and possibly sanitation services) may be required for the operation phase. The water could potentially be provided from groundwater without any aquatic ecosystem impacts. This aspect would need to be investigated; however, boreholes should not be sited within or immediately adjacent to the watercourses and wetlands.

The potential aquatic biodiversity impacts of the proposed activities are likely to be very low in terms of any potential impact on aquatic habitat, biota, water quality, or flow for all phases of the proposed developments if mitigated as recommended by the measure indicated in the Wetland and Aquatic Impact Assessment (refer to Appendix E3)

5.3.1.4 Avifauna

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 avifauna biodiversity on the site in more detail.

Avifauna

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 avifauna biodiversity on the site in more detail. A baseline description of the avifaunal community has been provided in the Terrestrial Biodiversity Assessment (Appendix E2) and avifaunal site sensitivity verification report

(attached as Appendix E4) was undertaken for this project. Sampling of the entire proposed Paradys PV Cluster was conducted in winter, over 8 days from 13-20 April 2023. The second site visit was conducted in an early spring survey, over 6 days from 11- 16 September 2023.

Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (BirdLife South Africa, 2017). According to Birdlife South Africa (2017), selecting IBAs is achieved by applying quantitative ornithological criteria grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among and enabling comparability between sites at national, continental and global levels. The Avifaunal Impact Assessment confirms that the PAOI is not in close proximity of any IBA.

Coordinated Avifaunal Roadcount

The Animal Demographic Unit (ADU)/Cape bird club pioneered the avifaunal road counts of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus*) and Denham's/Stanley's Bustard (*Neotis Denham*). Today it has been expanded to monitor 36 species of large terrestrial birds (cranes, bustards, korhaans and storks) along 350 fixed routes covering over 19 000 km. Road counts are carried out twice yearly in midsummer (the last Saturday in January) and midwinter (the last Saturday in July) using this standardised method. These counts are essential for conserving these larger species that are under threat due to habitat loss through land use changes, increases in crop agriculture and human population densities, poisoning, and man-made structures like powerlines. With the prospect of increasing wind and solar farms, using renewable energy sources and monitoring these species is most important (CAR, 2020). The Avifaunal Impact Assessment confirms PAOI overlaps with Coordinated Avifaunal Roadcount Routes.

Coordinated Waterbird Count

The ADU launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds, including population size, how waterbirds utilise water sources and determining the health of wetlands. The PAOI is in close proximity with 2 Coordinated Waterbird Count sites.

During the assessment SABAP2 data indicate that 291 avifauna species are expected for the PAOI and surrounding habitats. Of these, 15 are considered SCC and include those listed in Table 5.5. Eighty (80) of the 291 expected species were observed during the single site visit. Only two SCC have been observed during the first field investigation.

Table 5.5: Expected avifauna Species of Conservation Concern that are expected to occur within the PAOI. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable

Common Name	Scientific Name	Regional	Global	Likelihood of Occurrence
Curlew Sandpiper	*Calidris ferruginea*	LC	NT	Low
Abdim's Stork	*Ciconia abdimii*	NT	LC	Moderate
African Marsh Harrier	*Circus ranivorus*	EN	LC	Moderate
European Roller	*Coracias garrulus*	NT	LC	Low
Lanner Falcon	*Falco biarmicus*	VU	LC	Confirmed
Black-winged Pratincole	*Glareola nordmanni*	NT	NT	Moderate
White-backed Vulture	*Gyps africanus*	CR	CR	Low
Caspian Tern	*Hydropogne caspia*	VU	LC	Low
Yellow-billed Stork	*Mycteria ibis*	EN	LC	Moderate
Maccoa Duck	*Oxyura maccoa*	NT	EN	Moderate
Lesser Flamingo	*Phoeniconaias minor*	NT	NT	Low
Greater Flamingo	*Phoenicopterus roseus*	NT	LC	Low
Martial Eagle	*Polemaetus bellicosus*	EN	EN	Low
Secretarybird	*Sagittarius serpentarius*	VU	EN	Confirmed
African Grass Owl	*Tyto capensis*	VU	LC	Confirmed

The different habitat types within the PAOI were delineated and identified based on observations during the field assessment and available satellite imagery. These habitat types were assigned Site Ecological Importance (SEI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern. The habitat types were delineated within the Project Area, namely Bushveld, Degraded Bushveld, degraded Bushveld and Modified habitat. Their respective SEI and the corresponding mitigation guidelines are visually illustrated in Figure 5.18.

One active *Typo capensis* (African Grass Owl) nest site was recorded during the first site assessment. However, this nest were not active during the second field investigation and fell outside the PV area, thus medium sensitivity of the area being used.

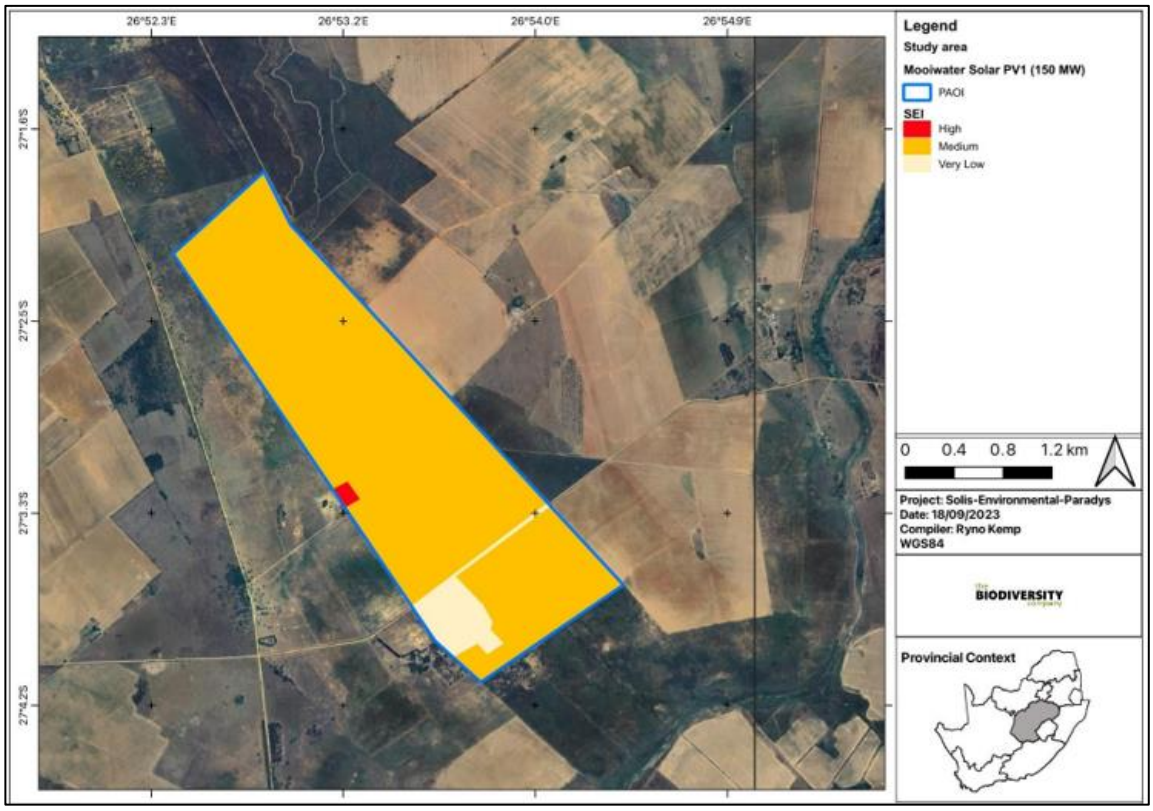


Figure 5.18: Avifauna Site Ecological Importance (SEI) for the proposed Solar Power Plant (SPP) Project Area

Impacts to Avifauna

The Avifauna Impact Assessment highlights that anthropogenic activities and influences are present within the landscape, which have several negative impacts to biodiversity, including avifauna. These include:

- Historical and current agricultural activities;
- Farm roads and main roads (and associated traffic and wildlife road mortalities);
- Grazing and trampling of natural vegetation by livestock;
- Invasive species; and
- Fences and associated maintenance

The impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess and evaluate the magnitude on the identified terrestrial biodiversity. These impacts can be summarised in table 6.1 of the Avifauna Impact Assessment submitted as Appendix E4.

Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat fragmentation as a result of project infrastructure and species disturbance or mortality as a result of project operations.

Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence.

Cumulative impacts – Impacts that result from the successive, incremental and/or combined effects of existing, planned and/or reasonably anticipated future human activities in combination with project development impacts.

Impacts to avifauna are considered to be Medium to Low with mitigation measures in place. Management measures include ensuring the construction footprint is kept small and industry-standard mitigations are put into place for solar panels, fencing and electrical infrastructure, among other measures. The project area is located within the Klerksdorp REDZ as well as the Central STC and therefore facilitates the process for responsible renewable development. All project aspects can be effectively mitigated to an acceptable residual impact in support of the renewable development project. Therefore, it is of the opinion of the avifaunal specialist that the project be supported.

5.3.1.5 Visual Landscape

Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or from parks and conservation areas, highways and travel routes, and important cultural features and historic sites.

The study area is characterised by kopppies, rivers and smaller streams, farmsteads and agricultural fields, small towns, and mining activities. The koppies, rivers and streams create a rolling topography. The vegetation types within the study area are characterised by Mucina and Rutherford (2006) as Rand Highveld Grassland, Vaal-vet Sandy Grassland and Highveld Salt Pans. The Project area is also characterised by a rolling topography which is created by the Vaal River, Renoster River, Olivantsvlei and the Paradys koppie that traverse the study site. The vegetation is a combination of grassland and bushveld trees with a medium height, as well as agricultural fields. In some sections the vegetation cover is dense, especially along the roads and surrounding the farmsteads, but most of the study area has a vegetation cover that comprise of grass and agricultural fields. The Vaal River is located to the north of the study site, with the Renoster River and Olifantsvlei located to the east and the south of the study site.

Different types of land use occur within the surrounding area of the site which contributes to the landscape. These include:

• **Residential:** The residential component of the study area mainly consists of farmsteads and villages where the farm workers stay. There are a few small holdings and residential units located along the Vaal and Renoster River. The bigger towns are Viljoenskroon (17km south-east), Orkney (17km north-west) and Stilfontein (18km north-west) with smaller informal settlements such as Umzimhle located approximately 16km to the north-west of the study site.

• **Industrial / Mining:** There is only one mine located within the study area, Harmony Moab Mine, but there are several mines located to the north-west of the study site. The mines include Vaal Reefs Mine, Kopanang Gold Plant, Buffelsfontein Mine and Nicolor South Plant. The Vierfontein Mine is located to the south-west of the project site.

• **Infrastructure**: The access road to the project site is a gravel road (Vermaadrift Road). Other roads include the S643, the R501, which will form the main access road, the R76 and other farm roads that connect the farmsteads. The infrastructure includes the existing Eskom lines that traverse the study area as well as the substation located at the entrance to the Senekal Boerdery.

• **Institutional / Recreational**: There are no institutional facilities. There are several recreational facilities, which is mainly fishing, located along the Vaal and the Renoster River. There are two schools located within the study area but from the site investigation conducted by the specialist it was confirmed that they are no longer in use. The schools include Klipplaat Primary School and Hwetla Primary School.

• **Tourism**: The tourist facilities are located along the Vaal River and the following attractions were noted during the site inspection. These include; Wawielpark Holiday Resort; Seekoeigat; Hennie en Magda se Visvang Hoekie; Renovaal; Inyadu Lodge; Clementia Function Venue; and Wild, Voël en Vis Reservaat.

Visually Sensitive Areas:

Only one visual sensitive area was identified during the site inspection, the Paradys Koppie, which runs in from the north-eastern to a south-western corner of the project site. The visual sensitive area or no-go area(illustrated as brown area) includes the crest and higher laying slope of the koppie. No development should take place on these sections due to the height and the visibility of the koppie. The higher the panels are placed on the koppie (slope of the koppie), the more visible it will be to viewers surrounding the project siteand the more difficultit becomes to mitigate the visual impact. The Paradys Koppie is excluded from the Mooiwater Solar PV 1 Project footprint.

Glint and Glare:

The reflective properties of solar PV panels vary from different manufacturers and although some claim that the solar panels are ‘anti-glare’, no solar panel absorbs 100% of the incoming light (Scrivener, 2017). It can therefore be said that solar PV panels have the potential to produce a solar reflection which could be a potential hazard or cause an impact. Glint is defined as a momentary flash of bright light whereas glare is defined as a continuous source of bright light. If you place it in context, as explained by Scrivener, 2017, glint will be witnessed by moderate to fast moving receptors whilst glare would be encountered by static or slow-moving receptors with respect to a solar farm. The term ‘solar reflection’ is used to refer to both reflection types (glint and glare).

No Glint and Glare Assessment will be required since the only aerodrome, that was noted during the site inspection, is located approximately 13 km to the north-west of the Mooiwater Solar PV1 project site. Measures were taken to ensure that the solar panels that are chosen for the project is the best technology with the least impact on the environment, include the visual impacts caused by glint and glare. It is therefore not anticipated that the project will have a glint and glare impact.

Visual Receptors

According to the Visual Impact Assessment (attached as Appendix E5), visual receptors can be defined as: *"Individuals, groups or communities who are subject to the visual influence of a particular project"*. Possible visual receptors identified within the 10km radius landscape, which due to its land use could be sensitive to landscape change. They include:

- **Nature Reserves, National Parks and Tourist Destinations** which include:
  - Seekoigat
  - Wawiel Park
  - Inyadu Lodge
  - Renovaal
  - Hennie & Magda se Visvanghoekie
  - Wild, Voël en Vis Reservaat
- **Human Settlements and Farmsteads** which include:
  - The Outback Farm
  - The Waterford Boerdery
  - Farmsteads located to the south, southwest and along the north-eastern corner of the site
  - Farmstead located on the corner of the S462 & S463 (South-east of site)
  - Farmstead located on the S462 (south of site)
  - Farmstead along Vermaasdrift Rd (West of the site)
- **Scenic Routes and Arterial Roads** which include:
  - No scenic routes.
  - Sections of the Vermaasdrift Rd
  - Sections of the S463
  - Sections of the S462

Visual exposure is determined by qualifying the visibility with a distance rating to indicate the degree of intrusion and visual acuity. The following criteria was used to describe the visual exposure:

Table 5.6: Model Assumptions

Radius	Visibility rating in terms of proximity
0-1km	High
1-3km	High-Moderate

3-5km	Moderate
5-10km	Low

Table 5.6 below reflects the visibility rating in terms of proximity on sensitive receptors of the proposed solar PV facility. The Visual Exposure map will give a clearer understanding of areas susceptible to line of sight to the solar PV facility and both grid alternatives within a 10 km radius.

Table 5.7: Visual Exposure rating in terms of proximity to the solar PV facility

Foreground View	**Middle-ground View**		**Background View**
High **0km - 1km**	**High-Moderate** **1km - 3km**	**Moderate** **3km - 5km**	**Low** **5km - 10km**
The project will be in the foreground for viewers located within this zone. Views will vary from clear to partially obstructed views. Viewers include: • The Outback Farm • Farmsteads located to the south and along the north-eastern corner • Sections of the Vermaasdrift Rd • Sections of the S463	The project will be in the middle ground for viewers located within this zone. Views will vary from clear, partially obstructed to completely screened views. Viewers include: • The Waterford Boerdery • Farmstead located on the corner of the S462 & S463 (South-east of site) • Farmstead located on the S462 (south of site) • Farmstead along	The project will be in the middle to background for viewers located within this zone. Views will vary from partially to obstructed/ screened views. Viewers include: • Tourist accommodation along the Vaal River such as Renovaal, and Inyadu Lodge • Seekoigat • Farmstead located south-west of the site • Farmstead along Vermaasdrift Rd (North-west of the site) • Farmstead located along	The project will be in the background for viewers located within this zone. Views will vary from partially to obstructed/ screened views. Viewers include: • Tourist accommodation along the Vaal River such as Wawiel Park • Wild, Voël en Vis Reservaat • Farmstead located to the south, east and the south-west of the site. • Sections of the S463 • Sections of the S462

	Vermaasdrift Rd (West of the site) • Sections of the Vermaasdrift Rd • Sections of the S463 • Sections of the S462	Olifantsvlei (south-east of the site) • Sections of the Vermaasdrift Rd • Sections of the S463 • Sections of the S462	• Section of the R76

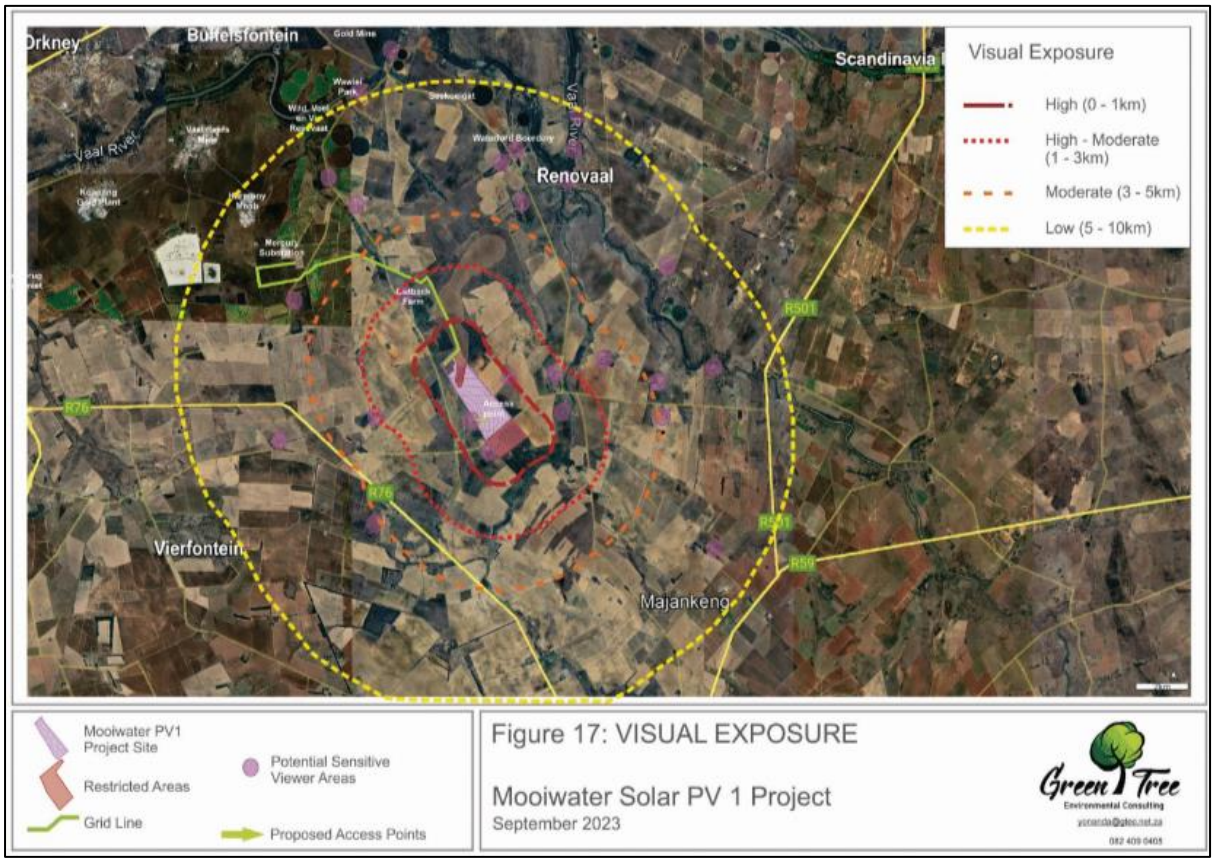


Figure 5.19: Visual Exposure Map for the Mooiwater Solar PV1 Project.

It is anticipated that the significance of the visual impact will be "Negative Moderate" but with the correct and successful implementation of mitigation measures it will be "Negative Low" for the Mooiwater Solar PV1 Project.

5.3.2 Social Impact Assessment

The Social Impact Assessment (attached as Appendix E6) explains that the Free State Province is located in the central part of South Africa and bordered by six of the nine provinces, with Gauteng, Mpumalanga and North West bordering to the north, Northern Cape to the west, KwaZulu-Natal to the east, and Eastern Cape to the south. The remaining border section of the province is shared with the independent state of Lesotho, providing an important transportation route for Lesotho.

The Free State Province is the third largest province in South Africa covering an area of 129 825 km^2, while only accommodating the second lowest population and density, with 2 834 714 people at a population density of only 5.1%. The judicial capital of the country Bloemfontein is situated in the heart of the province, with other major towns including Welkom, Kroonstad, Sasolburg and Bethlehem.

Topographically the province is situated on a plateau rising to elevation of 1 800 m above mean sea level in the east, sloping down to the west at the Orange River around 1 200 m above mean sea level.

The Orange River and Vaal River form the majority of the boundaries of the province, with the first delineating from the southern and second the northern boundary.

Agriculture, mining and manufacturing dominate the economic sector within the province, with 90% of the geographical area used for agricultural activities. Approximately 34% of maize, 37% of wheat, 33% of potatoes, 53% of sorghum, 30% of groundnuts, 18% of red meat and 15% of wool of South Africa's produce is produced in the province. Mining is another major economic driver with the province, specifically with the province identified as the fifth-largest gold producer in the world, additionally the mining sector is a major employer in the province. The province also hosts a leader in the chemical manufacturing industry with Sasol as a gigantic synthetic-fuel industry.

The Free State Province is divided into five (5) district municipalities, i.e. the Fezile Dabi, Thabo Mofutsanyana, Lejweleputswa, Manguang and Xhariep district municipalities. Figure 5.21 below illustrates the location of the District Municipality within the Free State Province. The study area is located within the Fezile Dabi district municipality.This district municipality covers an area of approximately 20 668 km² and consists of four (4) local municipalities, i.e. the Moqhaka, Ngwathe, Metsimaholo, and Mafube local municipalities. The proposed Mooiwater SEF is located in the Moghaqa Local Municipality, which comprises of 7 925 km² and the administrative seat is located in the town of Kroonstad.

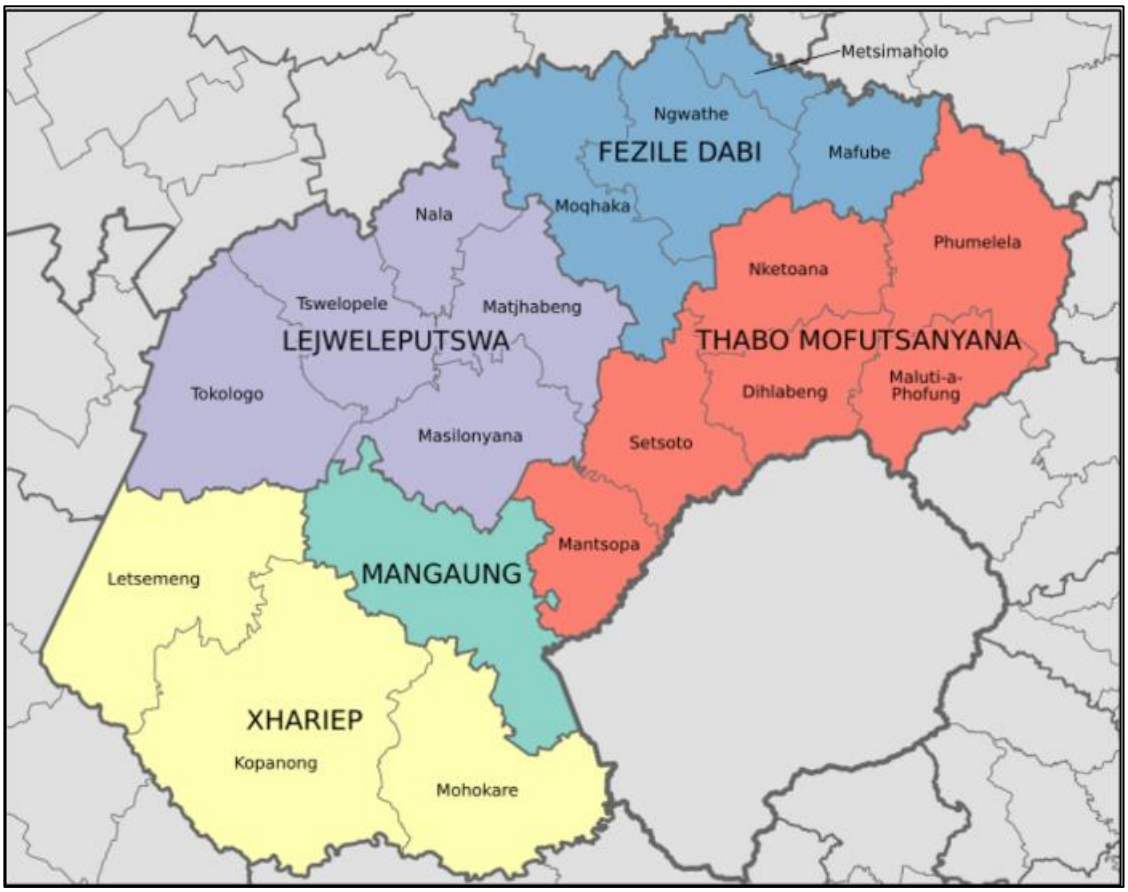


Figure 5.20: District Municipalities located within the Free State Province

Fezile Dabi District Municipality

Fezile Dabi District Municipality's (DC20) population makes up 494 777 (17.45%) of the Free State Province. The Fezile Dabi District Population is distributed across the four local municipalities as displayed on the table below as sourced from Stats SA, Community Surveys 2016:

Table 5.8: Analysis of Demographic Profile of Fezile Dabi District Municipality (FDDM, 2002-2027:17)

Analysis of Demographic Profile: Fezile Dabi District Municipality				
Name of Local Municapility	**Total Population (SC 2016)**	**% of District Population**	**Total Population (Stats. 2011)**	**Growth rate from 2011 (%)**
Metsimaholo	163 564	33.05	149 108	2.1
Mafube	57 574	11.64	57 876	-0.1
Moqhaka	154 732	31.27	160 532	-0.8
Ngwathe	118 907	24.03	120 520	-0.3

From the above table, it is evident that the majority of the population in the district is situated in Metsimaholo Local Municipality (FS204), which accounts for 33.05% of the population of the district. It is followed by Moqhaka Local Municipality (FS201), with 31.27% of the district population, then followed by Ngwathe Local Municipality (FS203), which 24,03% of the district population. Mafube Local Municipality (FS205) has the smallest population percentage in the district at 11,64%.

Except for Metsimaholo Local Municipality which has recorded a positive population growth of 2.1% between 2011 and 2016, the other three municipalities have realised a negative growth, with Moqhaka Local Municipality's population having declined by 0.8%.

Private households provides employment to about 17.6% of the district's employed population, which is higher than the SA District average, followed by community and social services and agriculture, hunting and forestry. Electricity, gas and water sectors are providing the least employment in the district, at below 1%, which is in line with the SA District average. However, measures must be taken to explore the potential that these and other sectors such as manufacturing, construction, etc can be assessed to determine their potential to create more jobs in the district.

Moqhaka Local Municipality

The Mooiwater solar energy facility is located within the Moqhaka Local Municipality (MLM) within the Fezile Dabi District Municipality. The area of jurisdiction of the MLM is situated in the southern part of the Fezile Dabi District Municipality. The former Kroonstad, Steynsrus and Viljoenskroon

Transitional Local Councils and sections of the Riemland, Kroonkop and Koepel Transitional Rural Councils are included in the MLM.

Apart from the dominant role agriculture plays in the region, no other significant economic activity exists. The Moqhaka area, like the rest of the Fezile Dabi District, is not considered as a primary tourist destination, although the area is increasingly becoming a favourite weekend destination. The hunting and guesthouse industries displayed an exceedingly rapid growth the past few years. Recreation areas and facilities are predominantly confined to the urban areas. The Kroonpark recreation and holiday resort in Kroonstad attracts interest throughout the region.

The Vaal River borders Moqhaka to the west. The Vals and Renoster Rivers drain through the area towards the Vaal River. These rivers play a significant role in providing the raw water supply to Kroonstad, Steynsrus and Viljoenskroon respectively. The topography of the area is particularly homogeneous with no prominent features and the area is characterised by extremely moderate slopes. The western areas, in the vicinity of Viljoenskroon, are known for various shallow and non-perennial pans.

The figure below indicates that the population of the municipality has decreased by 4.4% from 167 892 in 2001 to 160 532 persons in 2011. The community survey conducted during 2016 indicated that the population once again decreased with 3.61% to 154 732. Contrary to the aforementioned, the number of households increased by 10.0% from 41 514 in 2001 to 45 661 and increased again with 17.39% to 53 601 according to the Community Survey results of 2016.

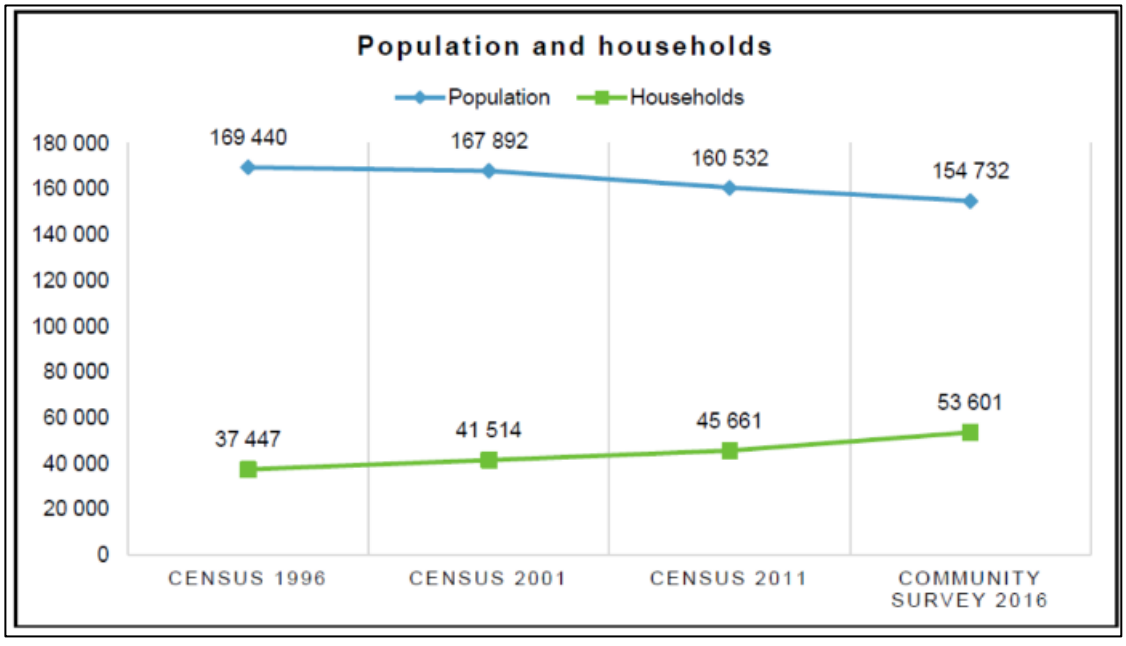


Figure 5.21: Population and household

The findings of the SIA for the proposed Mooiwater Solar PV1 demonstrates that during the construction and the operational phase, various employment opportunities, with different levels of

skills will be created. Additionally, this will also create local business opportunities benefitting the socio-economic development of the Local Municipality and the local communities of Viljoenskroon. The establishment of the proposed Mooiwater Solar PV1 is therefore supported by the findings of the SIA report and also creates a positive social benefit for society. It is recommended by the specialist of the SIA report, that the proposed Mooiwater Solar PV1 project be supported as it was proposed.

5.3.3 Cultural and Heritage Environment

In order to determine the feasibility of the project, a cultural heritage assessment was done for the proposed Mooiwater Solar PV One Project, in order to determine if there would be any red flag issues on the project site as assessed in the Heritage Impact Assessment (refer to Appendix E7).

Archaeology

Archaeological sites spanning different Stone Age periods have been discovered in the region, despite significant agricultural changes. In assessments of Pretorius Kraal 53, some modern buildings near the Vaal River were considered non-conservation-worthy. Artefacts from the Middle to Later Stone Age were observed on the Grootdraai 468 farm during an impact assessment of the Siyanda Solar farm. However, visibility challenges due to dense vegetation hindered ground visibility, and a proposed power line corridor was not surveyed. Two burial sites were recorded, guided by a local informant. Other assessments in the vicinity yielded archaeological materials, including stone artefacts and a blade-like flake potentially from the Middle Stone Age. An archaeological assessment for the Orkney PV Facility identified cemeteries, hinting at the likelihood of more burials and Stone Age artifacts on the proposed solar PV areas. An archaeological field survey is recommended.

In 2022, an HIA (Heritage Impact Assessment) was conducted by CTS Heritage for the nearby Mercury PV Cluster solar project. The assessment revealed a single archaeological site and a few scattered individual artifacts. These findings collectively suggest evidence of both Middle Stone Age (MSA) and Later Stone Age (LSA) human occupations in the region. Most discoveries were made in disturbed surface contexts and couldn't be definitively linked to a specific prehistoric era. However, one site appeared to be less affected by post-depositional processes and might have been recently exposed. In addition, an isolated historical burial and a burial ground from the past were identified close to the Zaaiplaats farm werf. These findings hold significant social and cultural value, rated as IIIA. The presence of these burials implies the potential for additional hidden or unmarked burials across the development area. It's probable that similar archaeological resources exist within this project's scope.

Archaelology Findings

The archaeology field assessment was completed for the whole of the Paradys PV Cluster Facility and the results of the assessment are relevant to determine the overall archaeological context and sensitivity of the development area.

Nearly 50 observations were made during the survey that consisted mainly of buildings and graves at the various werfs included in the study area. At Mooiwater, the older, likely original settlement footprint was obscured by dense bush and a number of informal 20th century graveyards are located

here. Iron Age stone walled kraals and Later Stone Age artefacts in hornfels, chert and quartz were found on and close to the ridge which arcs from the northeast around to the southwest. The kraal enclosures appear to be late, possibly 19th century and historical walling features are also present. Most of the ruins recorded on the various farms (eg Witfontein, Smaldeel, De Grendel, Deborah) were built from the 1940s onwards and typically consist of a row of staff cottages that have since been abandoned as the farms have changed hands and ownership has become more and more aggregated amongst the larger corporate agribusinesses.

In areas bordering the maize fields, isolated and disturbed finds of MSA material was also found and it is more than likely that these continued in the cultivated areas. Early MSA and Early Stone Age material is also buried beneath the topsoil but the proposed development is unlikely to require very deep excavations that will reveal material at these depths (refer to table 5.9).

Table 5.9: Heritage Resources identified

Obs#	Description	Type	Period	Density	Latitude	Longitude	Grade	Mitigation
035	Graves, born 1908, Johannes W? G? NG, completely overgrown, hard to tell how many are here	Graves/ Burial Grounds	Historic	n/a	-27.065817	26.899601	IIIA	100m Buffer
040	Rectangular stone kraal with entrance feature, historical	Structure	Historic	n/a	-27.053338	26.882659	IIIC	50m Buffer
041	More kraal features	Structure	Historic	n/a	-27.051986	26.882445	IIIC	50m Buffer
048	Graves	Graves	Modern	n/a	-27.0608371	26.8767177	IIIA	100m Buffer

5.3.4 Palaeontology

The SAHRIS Palaeosensitivity Map designates the development sites as having Low to Moderate fossil sensitivity (Figure 4). Based on the Council of GeoScience Map 2726 Kroonstad, the area intended for development is underlain by the Allanridge and Rietgat Formations of the Ventersdorp Subgroup. A palaeontological assessment by Butler (2016) for the approved Orkney PV facility connected to this OHL highlights the Ventersdorp Subgroup, which signifies a significant occurrence of igneous activity linked to the fracturing of the Kaapvaal Craton around 2.7 billion years ago.

Relevant to the area's proximity, Almond (2021) conducted an assessment for the nearby Siyanda Solar Power Plant. Almond notes that the broader region is composed of shallow marine carbonate bedrocks of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) of Precambrian age, known to contain various types of fossil stromatolites (microbial bio-sedimentary structures) such as domes and columns. Stromatolite occurrences on Farm Grootdraai 468 are documented in geological records. Despite this, the study finds that due to low topographic relief, extensive sandy soil cover, and dense vegetation, exposure of Precambrian bedrocks is limited within the solar facility and grid connection areas. Well-preserved stromatolites of scientific significance are rare, though the recorded stromatolite varieties are likely widespread within the concerned bedrock units (Oaktree and Monte Christo Formations). The overlying unconsolidated sandy deposits, primarily Late Caenozoic (Pleistocene to Recent), are generally devoid of fossils, with no fossil material discovered so far.

The adjacent Mercury PV Cluster's PIA by Bamford (2022) suggests negligible fossil preservation potential in the overlying Quaternary soils based on prior experience and the absence of previous fossils in the area. There's a slight possibility of fossils in the shales beneath the early Permian Vryheid Formation, requiring a Fossil Chance Find Protocol for Kleinfontein PV1. The PV projects occupy moderately sensitive Quaternary sands. Consequently, the Allanridge and Rietgat Formations are not known for fossils, making significant palaeontological impact unlikely, and no further assessment is needed.

Palaeontology findings

The palaeontological sensitivity of the area under consideration is presented in Figure 5.22. The site for development is in the moderately fossiliferous Kalahari sands (green) and moderately fossiliferous Daspoort Formation (orange) and non-fossiliferous Hekpoort Formation (grey).

Volcanic rocks such as diabase and andesitic lavas (Hekpoort Formation) do not preserve fossils as they have originated from below the earth's surface. No fossils have been reported from the Daspoort Formation quartzites but this formation is lumped together in the Palaeotechnical Report for the Free State (Groenewald et al., 2014) with the Magaliesberg, Timeball Hill and Silverton Formations, only some of which have recorded stromatolites. In addition, the area is covered with sols and has been cultivated for decades so any rocks have been removed.

Aeolian sands and alluvium are fairly mobile and very porous so they do not provide suitable conditions for preservation of organic matter (Cowan, 1995). Only in places where the sands have been waterlogged, such as palaeo-pans or palaeo-springs, is there any chance of fossilisation. For example, roots can be encased in calcium-rich or silica-rich sands and crusts, known as rhizoliths or rhizocretions, can form around the roots, invertebrates or bones around the margin of a pond, pan or spring (Klappa, 1980; Cramer and Hawkins, 2009; Peters et al., 2022).

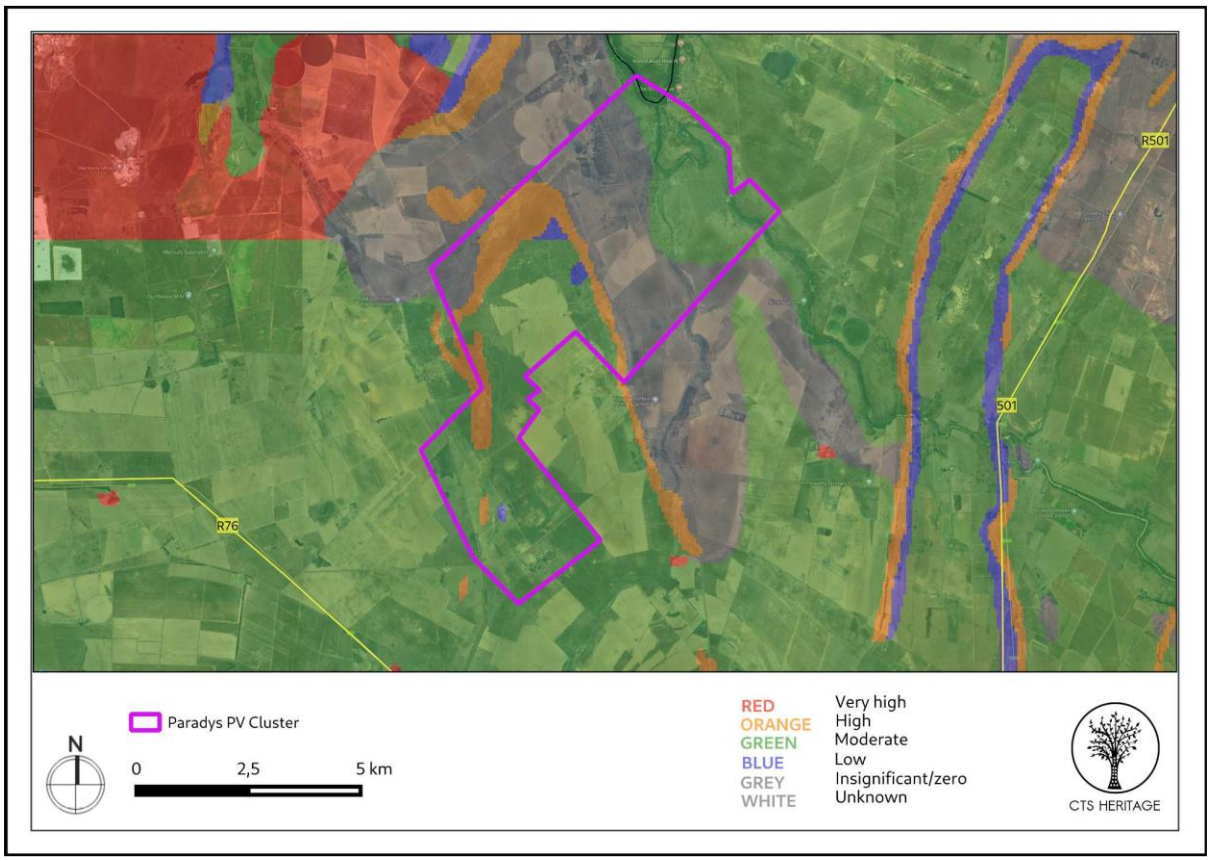


Figure 5.22: Palaeontological sensitivity of the proposed development area

5.3.5 Traffic

Due to the nature of the development, it is anticipated that the solar panel technology and large electrical components will be imported and arrive at ports of entry via ship. This required the identification of the most optimal shipping port(s) at which large components could be delivered to the region, the assessment of feasible transportation routes, route lengths and potential constraints to be considered in further phases of the project. Two possible ports of entry have been identified from where the solar panel technology and large electrical components will be transported, namely: Richards Bay and Durban. The distance from the Port of Richards Bay to the Mooiwater Solar PV1 is approximately 676 km via the R34 and R723 and from Port of Durban to the Mooiwater Solar PV1 is approximately 608 km via the N3, N5 and R76. Based on the shortest travel distance, it is recommended that the Port of Durban be the preferred port of entry (see table 5.10 below).

Table 5.10: Route overview – Port of Durban

PREFERRED ROUTE	ALTERNATIVE ROUTE
• Head north from the Port of Durban, • Turn right onto Quayside Rd, • At the roundabout, take the 1st exit and stay on Quayside Rd, • Continue onto Stalwart Simelane St, • Turn left onto Bram Fischer Rd/M4, • Continue on David Webster St/M4/R102 past Durban Central, • Merge onto N3 to Pietermaritzburg, Stay on N3, • Merge onto N5 via the ramp to N1/Harrismith/Bethelehem/Bloemfontein, • Continue onto Hospital Rd/R26 past Bethlehem, • Turn left onto Malan St, • Turn right onto Lindley St,	• Head north from Port of Durban, • Turn right onto Quayside Rd, • At the roundabout, take the 1st exit and stay on Quayside Rd, • Continue onto Stalwart Simelane St, • Turn left onto Bram Fischer Rd/M4, • Continue on David Webster St/M4/R102 past Durban Central, • Merge onto N3 to Pietermaritzburg, Stay on N3, • Stay on N3 until exit 133 for R34 towards Vrede/Frankfort, • Turn Left onto R34 and Stay on R34 past the town of Frankfort, and towards town of Heilbron, • Turn right then, Turn right onto Laer Street,

PREFERRED ROUTE	ALTERNATIVE ROUTE
• Turn left at the 3rd cross street onto Pretorius St, • Turn right onto Commissioner St/R76 past town of Lindley, Steynsrus and towards town of Kroonstad, • At the roundabout, take the 2nd exit onto South Rd/R76, • At the roundabout, take 2nd exit onto R76, • At the roundabout, take the 2nd exit onto Louw St/R76, • At the roundabout take the 1st exit, continue onto R76 towards town of Viljoenskroon, • Continue onto R76 past intersection with R59, • Turn right onto first intersection on your right after passing the river on your right, • Drive along the S643 gravel road, turn right on intersection between S642 & S643, • Access to Mooiwater SPP is situated off the S642 on the left-hand side.	• Turn left onto R723 towards town of Vredefort, • Turn right onto Plein St/R721, • Turn left onto 1ste Laan, • Turn left onto R59 towards town of Majankeng, • Turn right onto R501 towards Bruwer trekker Veld Dienst and Arthurs Rest, • Turn left on intersection across Bruwer Trekker Veld Dienst just before Arthur's rest intersection on the right, • Drive on the S642, past the S697 and S957 on your left and right respectively, • Access to Mooiwater SPP is situated off the S642 on the right-hand side.

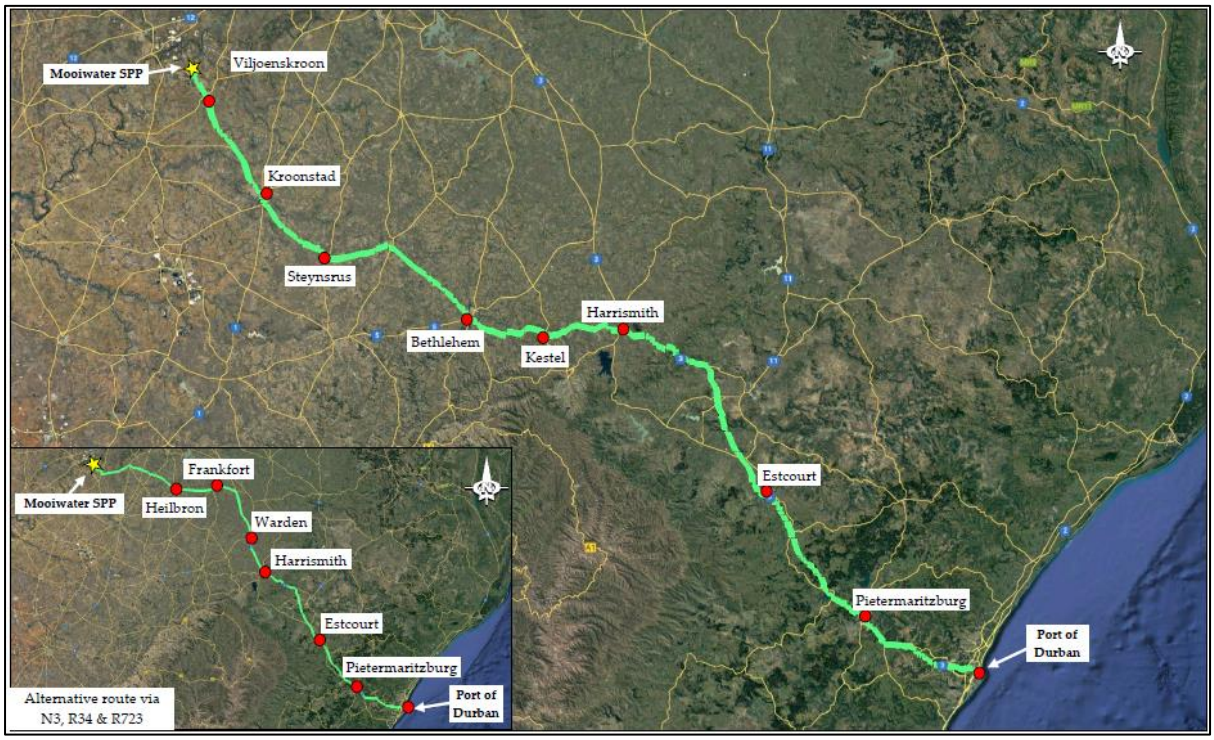


Figure 5.23: Preferred haulage route from Port Durban to Mooiwater Solar PV1 (via N3, N5 and R76)

Mooiwater Solar PV1 project is expected to generate additional traffic on the surrounding road network in three distinct phases, namely: construction, operation & maintenance, and decommissioning. Table 5.11 below provide the typical staff breakdown expected for the Mooiwater Solar PV1. It was assumed that 10% of staff/ workers will make use of private vehicles and the remaining 90% of staff/ workers will make use of public transport.

Table 5.11: Typical staff breakdown

STAFF CATEGORY	NO. OF STAFF	VEHICLE TYPE	VEHICLE OCCUPANCY	NO. OF VEHICLES
Construction labourers	254	Buses	60	**5**
Foremen	15			
Specialists	15	Light vehicles	1.2	**25**
Engineers	8			
Project Managers	8			

It should be noted that the majority of the other roads surrounding the proposed project site are unsurfaced (i.e., gravel or sand-based) roadways classified as Class 3 Rural Minor Arterial roadway and primarily fulfil an access function for the neighbouring farms. Two existing farm access roadways are located within the proposed site development footprint and these are shown on Figure 5.24. This may

likely be a requirement as part of the wayleave application approval of the *Matzikama Local Municipality*, *West Coast District Municipality* and *Western Cape Department of Roads and Transport*.

The existing external road network, in the vicinity of the Mooiwater Solar PV consists of the R30, R76, R59, R501 and R502. The road classification has been derived from the South African Classification and Access Management Manual (TRH 26).

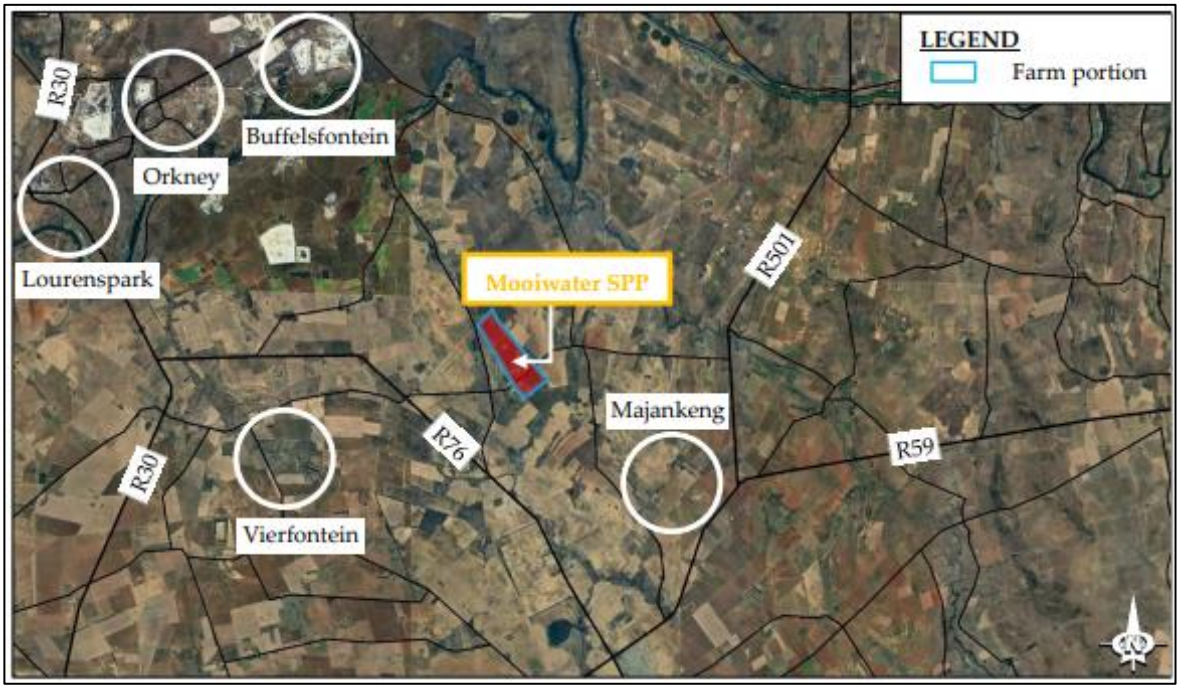


Figure 5.24: Existing external road network surrounding the Mooiwater Solar PV1 project

According to the assessment provided by the Traffic Impact Assessment, the preferred access to the Mooiwater Solar PV will be on the S642 via the R76 (see figure 5.25). There are two other alternative accesses, one connecting to the R501 and the other connecting to the R502. A more detailed assessment with information supporting the choice is contained in the Traffic Impact Assessment (Appendix E9). The preferred access route is recommended based on the fact that this access is an existing direct gravel road currently being utilized connecting from the preferred R76 and complies with the minimum spacing requirement of 260 m. The internal roads layout is dependent on the solar module layout; however, the anticipated length of internal roads is to be confirmed. Furthermore, smaller tracks may be required, for cleaning and maintenance of the solar modules.

A wayleave application for the site access will need to be lodged with the Free State Department of Community Safety, Roads and Transport. The formalisation of this access to the standard (AnnexureB), will in all probability be a requirement as part of the wayleave approval. There is an existing borrow pit number 185/15/20/62 on the farm Mooiwater 408, its access routes and boundaries must be retained.

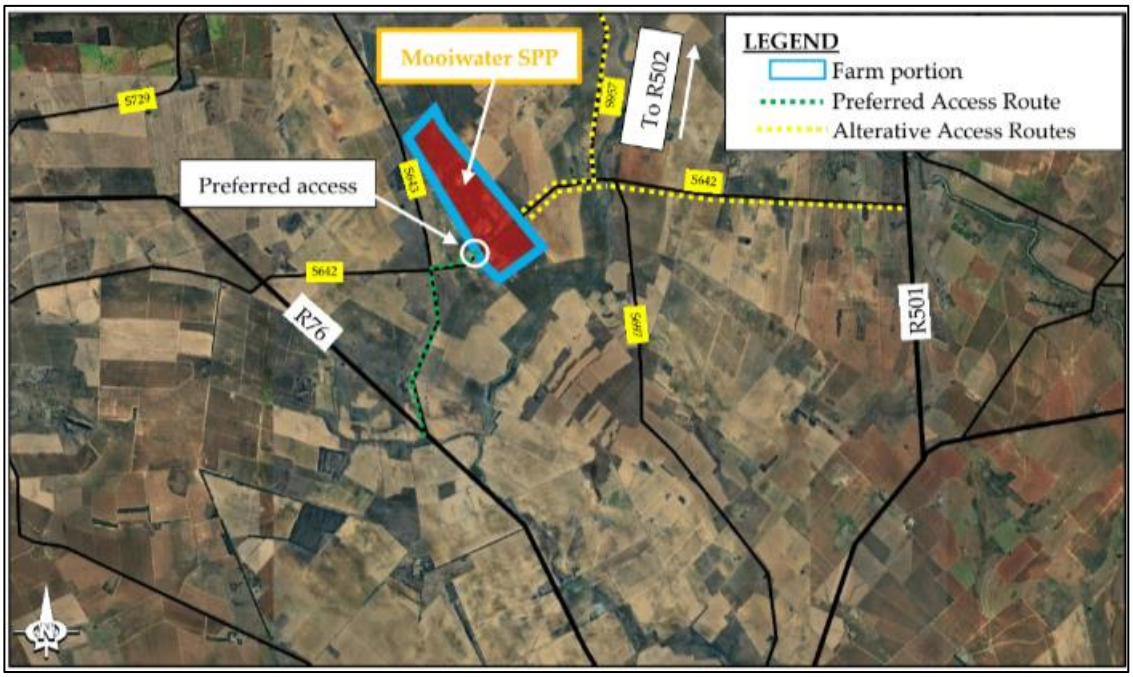


Figure 5.25: Preferred Site Access Route

5.4 SITE SELECTION MATRIX

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

The receptiveness of the site to Mooiwater Solar PV includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities (i.e., the grid connection points are located within the affected property which minimises the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). Portion 1 of Farm Mooiwater No 408 where the project is proposed to be located is considered favorable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the Solar PV facility 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. The Global Horizontal Radiation value is around 2118 kWh/m^2 per annum is relevant in the area.

- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and

maintenance of the facility and ensures that shadowing on the panels do not occur. The topographic conditions, which are favourable, minimises 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 up to 150 MW and space is a constraining factor in PV facility installations. Provision was made to assess a larger area than is required for the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. The Remainder of the Farm Mooiwater No. 466, and the development footprint assessed therein is considered to provide an opportunity for the successful construction and operation of a solar PV facility with a capacity of up to 150 MW, 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 capitalising hamper efforts to find suitable farms. Access to the site is most likely to be obtained via the R76 (Provincial Road) and existing farm roads.

- 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 proposed Mooiwater Solar PV overhead power line route will connect directly into the existing Everest Substation or via a Loop-In-Loop-Out (LILO) connection into existing Eskom infrastructure. Two (02) grid alternatives have been identified based on the location of the connection point into the national grid in relation to the proposed solar PV facility. These alternatives are however discussed in more detail in the Impact Assessment for the grid lines.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable in terms of geology, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape despite some of the environmental sensitivities identified (refer to Section 5.3.1 of this report). The area proposed for development exclusively consists of land used for agriculture, but wetland features are located within the PROJECT AREA, as well as crop fields on or in close proximity to the site and a historic homestead. These environmental sensitive features will need to be considered by the developer for the placement of the facility infrastructure within the development footprint.

It is evident from the discussion above that the Remainder of the Farm Mooiwater No. 408, may be considered favourable and suitable in terms of the site and environmental characteristics. As menti1d previously, no alternative areas on the property have been considered for the placement of the development footprint as the assessed development footprint will aim to avoid areas that are under

cultivation within the affected property. The development footprint of this project will cover a significant portion of the farm; however, provision will be made to exclude any sensitive areas from the facility layout to be developed within the development footprint.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

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

Therefore, development of the up to 150 MW Mooiwater Solar PV on Portion 1 of Farm Mooiwater No. 408 is the preferred option.

The draft layout considers technical constraints as a part of this scoping process. Where specific features of environmental sensitivity are identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers will be considered by the developer during the EIA phase to ensure that the facility layout is appropriate considering the sensitive features present. Refer to Figure I for the draft layout proposed for development.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

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

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

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

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

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

(i) cumulative impacts;

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

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

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

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

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

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

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

6.1 SCOPING METHODOLOGY

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

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.

- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof

on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist Analysis

The independent consultant conducted a site visit on 6 July 2023. 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 to assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	UN-SURE	DESCRIPTION
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland		X		No wetlands or rivers are located within500m of the site.
II. A conservation or open space area		X		No SA Conservation Areas are located 5km from the site
III. An area that is of cultural importance		X		No world heritage sites are located within 10km of the site
IV. Site of geological significance		X		None.
V. Areas of outstanding natural beauty		X		None.
VI. Highly productive agricultural land		X		Although there are crop fields they were not considered to have high productivity.
VII. Floodplain		X		None.

VIII. Indigenous Forest		X		None.
IX. Grass land	X			Most of the PV site is located on the Vaal-Vet Sandy Grassland (Gh10) except for a small portion to the northeast of the site which is located on the Rand Highveld Grassland (Gm11). Both these vegetation units are reclassified as 'Endangered'
X. Bird nesting sites		X		Not located in an IBA
XI. Red data species		X		None.
XII. Tourist resort		X		None.

2. Will the project potentially result in potential?				
I. Removal of people		X		None.
II. Visual Impacts	X			The significance of the visual impact will be a "Negative Low Impact" after mitigation for the SEF combined with either grid options. The only receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads.
III. Noise pollution	X			Construction activities will result in the generation of noise over a period of 24 months. The noise impact is unlikely to be significant.
IV. Construction of an access road	X			Access is most likely to be obtained via the R76 and R501 Regional Road and existing farm roads. Internal access roads linking the various comp1nts will also be required.

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.	X			Approximately 347 employment opportunities will be created during the construction phase and up to 16 permanent employment opportunities during the operational phase.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	X			The estimated amount of water required during construction is 14 247L per day. The estimated maximum amount of water required during the operational phase is 2813L per day.
VIII. Job creation	X			Approximately 347 employment opportunities will be created during the construction phase and up to 16 permanent employment opportunities during the operational phase.
IX. Traffic generation			X	The estimated trip generation during the construction phase will include normal heavy load (solar panels); normal heavy load (construction materials); and Private vehicles (staff).
X. Soil erosion	X			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		X		None.
3. Is the proposed project located near the following?				

I. A river, stream, dam or wetland		X		No wetlands or rivers are located within500m of the site.
II. A conservation or open space area		X		The site is not located within 5km of protected areas
III. An area that is of cultural importance	X			No world heritage sites are located within 10km of the site
IV. A site of geological significance		X		None.
V. An area of outstanding natural beauty		X		None.
VI. Highly productive agricultural land	X			Numerous areas identified as crop fields are located around the project area.
VII. A tourist resort		X		None.
VIII. A formal or informal settlement	X			Viljoenskroon is located approximately 16km southeast of the proposed project 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) for more in-depth assessment during the EIA process. An indication is provided of the specialist studies being conducted and which informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.

- **Receptor**: Highlights the recipient and most important comp1nts of the environment affected by the stressor.
- **Impacts**: Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation**: Impacts need to be mitigated to minimise the effect on the environment.

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

METHOD OF ENVIRONMENTAL ASSESSMENT

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

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 4.1.

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.

Impact Rating System

The Impact assessment must take account of the nature, scale, duration, extent 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 6.2: The 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.
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.

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 to minor cumulative effects.
3	Medium cumulative impact	The impact would result in minor to moderate cumulative effects.

4	High cumulative impact	The impact would result in significant cumulative effects
PROBABILITY	**PROBABILITY**	**PROBABILITY**
This describes the chance of occurrence of an impact.	This describes the chance of occurrence of an impact.	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).

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.

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.

5.5.1 Mitigation Confidence

The significance of the impact is assessed following the implementation of mitigation measures, based on the confidence levels that the mitigation measures will reduce and/or enhance the impact.

Mitigation Confidence - Negative and Positive Impacts

1	Very low	There is no confidence that the mitigation measures will reduce/enhance the impact.
0.8	Low	20% confidence that the mitigation measures will reduce/enhance the impact
0.5	Moderate	50% confidence that the mitigation measures will reduce/enhance the impact
0.2	High	80% confidence that the mitigation measures will reduce/enhance the impact

Table 6.3: Matrix analysis

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

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
CONSTRUCTION PHASE															
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."*	PV Panel Array - To produce up to 150MW the facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from	Flora and Habitats	• Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop habitats in certain areas), ecosystems and the vegetation community (including protected plants).	2	4	3	3	4	4	3	**60**	See Table 6.4	0,5	**30**	Terrestrial Biodiversity Impact Assessment (Appendix E2)
		Flora and Habitats	• Introduction of IAP species and invasive fauna.	3	3	2	2	3	3	3	**48**		0,2	**9,6**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
Activity 19(i) (GN.R 327): *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (i) a watercourse."* Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters"* Activity 28 (ii) (GN.R 327): *"Residential,*	the inverter's output voltage to 33kV (the typical medium voltage levels encountered in a utility scale PV facility) to 132kV (at which voltage level power will be fed into the Eskom grid). The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is stepped up in transformers to 132kV. An onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed power line (which will be assessed as part of a separate Basic Assessment). It is	Fauna	• Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	2	3	2	2	3	2	3	**42**		0,5	**21**	
		Surface Water Resources / Wetlands / Riparian areas	Disturbance of aquatic habitat; water quality impacts	1	2	2	2	3	2	2	**24**	See Table 6.4	0,5	**12**	Wetland and Aquatic Biodiversity Impact Assessment (Appendix E3)
		Avifauna Habitats	Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop areas) ecosystems and the vegetation community (including protected plants) in an around the PAOI	2	4	3	3	4	4	3	**60**	See Table 6.4	0.5	**30**	Avifauna Impact Assessment (Appendix E4)
		Avifauna Habitats	Introduction of IAP species and invasive fauna.	3	3	2	2	3	3	3	**48**	See Table 6.4	0.2	**9.6**	Avifauna Impact Assessment (Appendix E4)

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare." Activity 56 (ii) (GN.R 327): *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*	expected that generation from the facility will connect to the national grid. Corridor will cover options to connect to the Mercury Substation or the Zaaiplaats Solar PV1 collector substation (a planned substation, under development by Mulilo, who are the proponents of Mooiwater Solar PV1, that forms part of the Mercury Solar PV cluster). 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.	Avifauna	Displacement of the indigenous avifauna communities (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	2	3	2	2	3	2	3	**42**	See Table 6.4	0.5	**21**	Avifauna Impact Assessment (Appendix E4)
		Avifauna	Direct mortality from persecution or poaching of avifauna species and collection of eggs	2	2	1	2	3	4	3	**42**	See Table 6.4	0.2	**8.4**	Avifauna Impact Assessment (Appendix E4)
		Soil and Agriculture	• Loss of land capability during the construction phase – PV Facility Loss of land capability during the construction phase – Grid Connection	1	2	1	1	3	2	2	**20**	See Table 6.4	0.5	**10**	Soil and Agriculture Impact assessment (Appendix E1)
		General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into	1	2	2	2	3	4	3	**42**	See Table 6.6	0.5	**21**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
Activity 1 (GNR 325) *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* *Activity 15 (GNR 325) "The clearance of an area of 20 hectares or more of indigenous vegetation."* *Activity 4 (b)(i)(bb)(ee) (GN.R 324): The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) Free State, (i) Outside urban areas (bb) National*	Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site: Operations & Maintenance Building / Office Switch gear and relay room Staff lockers and changing room Security control Offices Ablutions with conservancy tanks Construction camps (on laydown area) Workshop (Part of O&M Buildings) Temporary sanitation facilities during construction Storage Warehouse (Part of O&M Buildings) Diesel Storage Area Battery storage – The battery		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											

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
Protected Area Expansion Strategy Focus areas and (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional plans, Activity 10 (b)(i)(ee) (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	energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 2500MWh. Battery Storage Facilities will have a maximum height of up to 5m and will be installed in a 4.5-hectare area. Roads – Primary Access is most likely to be obtained via the R76 Regional Road. This has been confirmed in the Traffic Impact Assessment (Appendix E8) which has been commissioned. An internal site road network will also be required to provide access to the solar field and associated infrastructure.		source of water. Generation of hazardous waste												
		Visual Landscape	Change in the landscape character of the study area. Loss of the visual resource. Change in the sense of place of the area. Increase in the visibility of the project. Bad housekeeping can result to dust, waste/ litter on site and therefore create an eyesore.	2	1	2	2	4	3	2	**28**	• Good housekeeping to reduce impacts that could cause a nuisance. o Dust suppression o proper waste collection o clean and neat site camp/office o shade net to block views towards site camp/office • Retain the vegetation, especially along the boundary of the site	0.5	**14**	
		fauna & Flora	Soil erosion and siltation	1	2	2	2	1	1	1	**9**	See Table 6.4	0.4	**3.6**	Traffic Impact Assessment (Appendix E9)
		Surface Water Resources / Wetlands / Riparian areas	e.g. Loss of flora within footprint and species of conservation concern (SCC)	3	2	2	3	3	2	3	**45**		0.5	**22.5**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
exceeding 80 cubic metres (b) Free State, (i) Outside urban areas (bb) National Protected Area Expansion Strategy Focus areas, (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional plans. Activity 12 (b)(i)(ii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) Free State (i) within any critically endangered or endangered*	Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 3 –4.5 meters will be used.	Avifauna Habitats	Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive rocky areas, and protected plants).	2	3	2	2	3	3	3	**45**		0.5	**22.5**	
		Avifauna Habitats	Continuing spread of IAP and weed species	3	3	2	2	3	2	3	**45**		0.5	**22.5**	
		Avifauna	Ongoing displacement and direct mortalities of the avifauna community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	2	3	2	2	3	2	3	**42**		0.5	**21**	
		Avifauna	Collision with Solar Panels, fencing and any other infrastructure	2	4	4	4	3	3	3	**60**		0.5	**30**	
		Avifauna	Heat Radiation from the BESS and Solar Panels	1	3	3	3	2	3	3	**45**		0.5	**22.5**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004, (ii) Within critical biodiversity areas identified in bioregional plans. Activity 18 (b)(i)(bb)(ee)(hh) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) Free State (i)*		Traffic	Increase in traffic volumes leading to and surrounding the SPP	3	2	1	1	2	2	2	**22**		1	**22**	
		Social impacts	The creation of local employment and business opportunities, as well as opportunities for skills development and on-site training.	3	1	4	1	4	3	4	**64**		1	**64**	
			The potential maximising of opportunities to local and regional SMMEs and other businesses for service delivery.	2	1	2	1	3	3	3	**36**	See Table 6.4	1	**36**	Social Impact Assessment (Appendix E6)
			The provision of technical support and advice to local farmers and the municipality in terms of the establishment of solar energy technologies to meet their energy needs	2	1	2	1	3	2	1	**11**		1	**22**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
Outside urban areas (bb) National Protected Area Expansion Strategy Focus areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional plans, hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."			The potential in-migration or potential influx of job seekers that potentially might have impacts on family structures, communities, social networks, and basic community services of the LM	2	1	1	1	3	3	2	**22**			**11**	
			The potential safety risk for farmers, risk of livestock theft and farming infrastructure, that are associated with the construction phase and the presence of the workers on the proposed construction site.	2	1	1	1	3	1	2	**18**		1	**9**	
			The potential increased risk of veld fires associated with the construction phase	3	1	1	1	3	1	3	**30**		1	**9**	
			The presence of construction workers on-site and in the area on the local communities of Viljoenskroon, and on their social	2	1	1	1	3	3	1	**11**			**11**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
			networks and on family structure												
OPERATIONAL PHASE															
LN1 - Activity 11 (i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* *Activity 14 (GNR 327): "The development and related operation of facilities or infrastructure, for the storage, or for the*	The key components of the proposed project are described below: <u>PV Panel Array</u> - To produce up to 150MW the facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. Connection to the grid - Connecting the array to the electrical grid requires transformation of	Flora and Habitats	Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive rocky areas, and protected plants).	2	3	2	2	3	3	3	45	See Table 6.5	0,5	**22,5**	Terrestrial Biodiversity Impact Assessment (Appendix E2)
		Flora and Habitats	• Continuing spread of IAP and weed species	3	3	2	2	3	2	3	45		0,5	**22,5**	
		Fauna	• Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	2	3	2	2	3	2	3	42		0,5	**21**	
		Surface Water Resources /	• Degradation of the ecological condition of	1	3	2	2	3	2	2	**26**	See Table 6.5	0,5	**13**	Wetland and Aquatic Biodiversity

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
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 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*	the voltage from the inverter's output voltage to 33kV (the typical medium voltage levels encountered in a utility scale PV facility) to 132kV (at which voltage level power will be fed into the Eskom grid). The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is stepped up in transformers to 132kV. An onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed power line (which will be assessed as part of a separate Basic	Wetlands / Riparian areas	aquatic ecosystems; modification of flow and water quality; erosion; and alien vegetation invasion in aquatic features												Impact Assessment (Appendix E3)
		Visual landscape	• Change in the landscape character of the study area. Loss of the visual resource. Change in the sense of place of the area. Increase in the visibility of the project	2	1	2	3	4	4	2	**32**	•Good housekeeping to reduce impacts that could cause a nuisance. oDust suppression •Building should be painted a 'natural' colour. •Vegetate the areas that were exposed during the construction phase. •Retain the vegetation, especially along the boundary of the site	0,8	**25,6**	Visual Impact Assessment (Appendix E5)
		fauna & Flora	Soil erosion and siltation	1	2	2	2	1	1	1	**9**	See Table 6.5	0.4	**3.6**	Traffic Impact Assessment (Appendix E9)

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
bigger than 1 hectare." LN2 - Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."* Activity 10 (b)(i)(ee)(GN.R 324): "The development and related operation of facilities or infrastructure	Assessment). It is expected that generation from the facility will connect to the national grid. Corridor will cover options to connect to the Mercury Substation or the Zaaiplaats Solar PV1 collector substation (a planned substation, under development by Mulilo, who are the proponents of Mooiwater Solar PV1, that forms part of the Mercury Solar PV cluster). <u>Inverters</u> - Sections of the PV array will be wired to inverters. The inverter is a pulse-width mode	Surface Water Resources / Wetlands / Riparian areas	e.g. Loss of flora within footprint and species of conservation concern (SCC)	3	2	2	3	3	2	3	**45**		0.5	**22.5**	
		Avifauna	e.g. Employment during construction phase	2	2	2	3	4	2	3	**45**		1	**45**	
		Traffic	Increase in traffic volumes leading to and surrounding the SPP	2	3	1	1	3	1	1	**11**		1	**11**	
		Social impacts	Impact on the tourism industry.	2	3	1	1	3	2	2	**24**	See Table 6.5	0.5	**12**	Social Impact Assessment (Appendix E6)

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (b) Free State, (i) Outside urban areas, (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional plans. Activity 12 (b)(ii)(iv) (GN.R 324):_____*"The clearance of an area of 300 square metres or more of indigenous vegetation (b)*	inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site: Operations & Maintenance Building / Office Switch gear and relay room Staff lockers and changing room Security control Offices Ablutions with conservancy tanks Construction camps (on laydown area)		The visual impact and associated impact on the sense of place.	2	3	3	1	4	3	2	**32**		1	**16**	
			The potential benefits associated with the establishment of a Community Trust which is funded from the revenues generated from the sale of energy /	2	3	4	1	3	3	2	**32**		1	**48**	
			The generation of additional income for landowners representing a significant benefit for the affected farmer	1	3	1	1	4	2	2	**24**		1	**36**	
			The establishment of renewable energy infrastructure and the generation of clean, renewable energy for South Africa	4	3	4	1	4	3	2	**38**		1	**38**	
			The creation of local employment and business opportunities, as well as opportunities for	2	3	4	1	4	2	2	**32**		1	**32**	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
Free State (ii) Within critical biodiversity areas identified in bioregional plans, (ii) Within critical biodiversity areas identified in bioregional plans (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland." LN3 - Activity 18 (b)(i)(ee)(hh) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) Free State (i) Outside urban areas (ee) Critical biodiversity areas as*	Workshop (Part of O&M Buildings) Temporary sanitation facilities during construction Storage Warehouse (Part of O&M Buildings) Diesel Storage Area Battery storage – The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 2500MWh. Battery Storage Facilities will have a maximum height of up to 5m and will be installed in a 4.5-hectare area. Roads – Primary Access is most likely to be obtained via the		skills development and on-site training											

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		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
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."	R76 Regional Road. This has been confirmed in the Traffic Impact Assessment (Appendix E8) which has been commissioned. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 3 –4.5 meters will be used. -														
DECOMMISSIONING															

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description / consequence	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
	<u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	Surface Water Resources / Wetlands / Riparian areas	Disturbance of aquatic habitat; water quality impacts	1	1	1	2	3	2	2	**20**	See Table 6.6	0,5	**10**	Wetland and Aquatic Biodiversity Impact Assessment (Appendix E3)
		Visual landscape	• Change in the landscape character or the views from sensitive viewing points. Bad housekeeping can result to dust, waste/ litter on site and therefore create an eyesore.	2	1	1	1	4	3	1	**12**	See Table 6.6	0,5	**6**	Visual Impact Assessment (Appendix E5)
		Traffic volumes	• e.g Increase in traffic volumes leading to and surrounding the SPP	2	1	1	1	2	1	1	**8**	Table 6.6	1	**8**	Traffic Impact Assessment (Appendix E9)
		Decommissioning	• The loss of employment opportunities and associated income.	2	2	2	1	2	1		**30**	Table 6.6	1	**18**	Social Impact Assessment (Appendix E6)

6.2 KEY ISSUES IDENTIFIED

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

6.2.1 Impacts During the Construction Phase

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

- LN 1 - 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."*

- LN1- Activity 19(i) (GN.R 327): "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (i) a watercourse."*

- LN1 - Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*

- LN1 - Activity 28 (ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*

- LN1 - Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*

- LN2 - 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..."*

- LN2 - Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."*

- LN3 - Activity 4 (b)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) Free State, (i) Outside urban areas, (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional plans."*

- LN3 - Activity 10 (b)(i)(ee)(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) 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."*

- LN3 - Activity 12 (b)(ii)(iv) (GN.R 324): "*The clearance of an area of 300 square metres or more of indigenous vegetation (b) Free State (ii) Within critical biodiversity areas identified in bioregional plans, (ii) Within critical biodiversity areas identified in bioregional plans (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- LN3 - Activity 18 (b)(i)(ee)(hh) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) 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."*

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

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment (Appendix E2)	Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community.	Negative High	Negative medium	• All 'Very High' SEI habitats are to be avoided and declared No-Go. Demarcate work areas during the construction phase to avoid affecting outside surrounding areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. These areas should be conserved and allow natural ecosystem processes to continue as normal. • Avoid the disturbance or destruction of High SEI areas , as far as possible. • The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. Indigenous vegetation to be maintained under the solar panels as much as possible to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • Existing access routes, especially roads, must be made use of. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site:

				• Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. • Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the Project site. • Any individual of the protected trees/plants that were observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants should be avoided. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the

				species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the 'Very Low' and 'Low' sensitivity areas. • Compile and implement a rehabilitation plan from the onset of the project. Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover. • Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • All construction waste must be removed from site at the closure of the construction phase. • Ensure that the site footprint is as small as possible and responsibly positioned, the development area must be properly fenced off during construction. • Land clearing must be done over at least three days and conducted linearly and successively from the south to the north; and

				• No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard.
	Introduction of IAP species and invasive fauna.	Negative medium	Negative low	• An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changes in IAP composition. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.
	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and	Negative medium	Negative low	• No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed

	disturbance (road collisions, noise, dust, light, vibration, and poaching).			limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods. • All vehicles should adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. • Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.

				• The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced

				to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).
Wetland Impact Assessment (Appendix E2)	Disturbance of aquatic habitat; water quality impacts.	Negative low	Negative low	• The recommended buffers between the delineated aquatic ecosystems and all the proposed project activities should be maintained. • The recommended buffer area between the aquatic features and the project components to ensure these aquatic ecosystems are not impacted by the proposed activities is 50m from the delineated edge of the wetlands. The highly degraded (low sensitivity) wetlands within existing cultivated lands are not deemed a constraint to the proposed project as they have already been significantly modified by agricultural activities and are of low aquatic sensitivity. • If the construction and operation of the PV modules does not require modification to the topography, topsoils or removal of indigenous grassland such that wetland functionality within these degraded wetland areas could be retained, the modules could be placed within the wetland areas mapped as being of low sensitivity. • Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. • The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance. During the construction phase, site management must be undertaken at the laydown and construction sites. This should specifically address on-site

				stormwater management and prevention of pollution measures from any potential pollution sources during construction activities such as hydrocarbon spills. • Any stormwater that does arise within the construction sites must be handled appropriately to trap sediments and reduce flow velocities.
Avifaunal Impact Assessment (Appendix E4)	Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop habitats in certain areas), ecosystems and the vegetation community (including protected plants) in and around the PAOI.	Negative High	Negative Low	• The areas to be developed must be specifically demarcated to prevent movement into surrounding environments. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, must under no circumstances be fragmented or disturbed further. • If possible solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity. • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	
	Displacement of the indigenous avifauna communities (including SCC) due to habitat loss, direct mortalities, and	Negative Medium	Negative Low	

	disturbance (road collisions, noise, dust, light, vibration, and poaching)			into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. • Leaking equipment and vehicles must be repaired immediately or be removed from PAOI to facilitate repair. • A fire management plan needs to be complied to restrict the impact of fire. • All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species, and owls, which are often persecuted out of superstition. Signs must be put up to enforce this. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40 km/h), to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.
	Direct mortality from persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	

				• Fencing mitigations: ➢ Top 2 strands must be smooth wire; ➢ Routinely retention loose wires; ➢ Minimum 300 mm between wires; and ➢ Place markers on fences. • Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place. • The duration of the construction must be kept to a minimum to avoid disturbing avifauna. • Outside lighting must be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) lights should be used wherever possible. • All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. • All areas to be developed must be walked through prior to any activity to ensure no SCC nests or avifauna species are found in the

				area. Should any Species of Conservation Concern be found and not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken. • Infrastructure must be consolidated where possible in order to minimise the amount of ground and air space used. • All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution • Use environmentally friendly cleaning and dust suppressant products. • As far as possible power cables within the PAOI should be thoroughly insulated and preferably buried. • Any exposed parts must be covered (insulated) to reduce electrocution risk • The BESS must be enclosed in a structure with a non-reflective surface • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. • All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution

				• Any exposed parts must be covered (insulated) to reduce electrocution risk
Agricultural Impact Assessment (Appendix E1)	Loss of land capability	Negative low	Negative low	• A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. • Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it remains at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion
	Soil erosion	Negative low	Negative low	
Heritage Impact Assessment (Appendix E7)	Loss or damage to sites, features or objects of cultural heritage significance	Negative low	Negative Low	• In general, sites such as these provide a significant amount of scientific information about the past when subject to appropriate analysis and as such, these sites have been determined to have high levels of scientific significance, and are graded IIIA. It is recommended that each of these identified sites have a no-development buffer area of 100m implemented around them. • Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The
Palaeontological Impact Assessment	Destroy or permanently seal-in fossils at or below	Negative medium	Negative low	

(Appendix E8)	the surface that are then no longer available for scientific study			geological structures suggest that the rocks are either much too old to contain body fossils or too young and friable to preserve fossils. Furthermore, the material to be excavated are soils and sands and they do not preserve fossils. Since there is an extremely small chance that fossils from below ground may be disturbed, a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low • Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below ground in the quartzites but this is very unlikely. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr.
Visual Impact Assessment (Appendix E5)	Visual impact of construction activities of the solar facility	Negative Low	Negative Low	• Good housekeeping to reduce impacts that could cause a nuisance. • Dust suppression • proper waste collection • clean and neat site camp/office • shade net to block views towards site camp/office • Retain the vegetation, especially along the boundary of the site
Social Impact Assessment (Appendix E6)	The creation of local employment, business opportunities, and opportunities for	Positive High	Positive High	Enhancement: • The project proponents of the Mooiwater SEF should liaise with the Local Municipality to establish a local skills database of companies for the associated area. This skills database should be made available to the contractors before the commencement of the construction phase to

	skills development and on-site training.			establish the extent of the potential service providers in the Local Municipality. • The key stakeholders, local authorities and the community need to be informed regarding the outcome of the decision of the proposed Mooiwater SEF. Local service providers should be notified of the tender process and assisted in this regard. The potential employment opportunities and the employment procedure that the project proponent intends to follow should also be clearly communicated before the commencement of the construction phase. • Reasonable and practical efforts should be made by the project proponent to appoint local contractors by implementing a 'locals first' policy. However, do to the technical nature of this project it is likely that skilled positions will be filled by people from outside the local areas. • Efforts should be made to employ local contractors first, and also contractors that are compliant with the Broad Based Black Economic Empowerment (BBBEE) criteria. • The recruitment selection process should also seek to promote gender equality. • If feasible, training and skills development programmes for the local workers should be initiated prior to the construction phase of the Mooiwater SEF.

	The maximising of opportunities to local and regional SMMEs and other business for service delivery.	Positive medium	Positive medium	• The project proponent of Mooiwater SEF should liaise with the LM to establish a database for the local companies/service providers of the associated areas. This database should be made available to the contractors before the initiation of the construction phase to notify and invite such service providers to tender for project-based services. However, it should be clearly communicated to potential contractors, that competitive tender processes may not guarantee the employment of local service providers. • Efforts should be made by the project proponent to assist local Broad Based Black Economic Empowerment (BBBEE) companies regarding the application and submission of tenders. • The LM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.
	The provision of technical support to local farmers and the municipality.	Positive low	Positive low	Enhancement: • Workshops and private consultations with the local farmers and the LOCAL MUNICIPALITY should be held to inform the and provide advice regarding the installation of solar energy facilities and the costs associated with it
	The presence of construction workers on-site and in the impacted area and communities	Negative low	Negative low	• The project proponent needs to develop a code of conduct which must be signed by appointed construction workers prior to the construction phase. The code of conduct should clearly outline the acceptable behaviour and activities of construction workers. In doing so construction workers will be legally informed and held liable for any damages or losses. It is however important that dismissals or fines must comply with the South African labour legislation.

				• The proposed site for the Mooiwater SEF should be clearly fenced off to effectively monitor the movement of construction workers in the vicinity of the project site. • The project proponent needs to arrange transportation for the construction workers on a daily basis, especially for low and semi-skilled construction workers, in order to enable the proponent to effectively monitor the movement of construction workers to and from the project site. Where necessary arrangements need to be made by the project proponents to enable construction workers to return to their hometowns over weekends/on a regular basis to reduce the potential risks posed to local family structures and social networks.
	In-migration of people (non-local workforce and jobseekers).	Negative low	Negative low	• As stated above a 'locals first' policy should be implemented by the project proponents, where the local community of Viljoenskroon should be employed first, specifically for un-skilled and low-skilled employment opportunities. • A policy that no employment opportunities will be available at the gate, should be implemented by the project proponent. • The proposed construction site for the Mooiwater SEF should be clearly fenced off for potential security risks in this regard. • Although the significance of this impact is likely to be low, the influx of job seekers cannot be avoided or prevented.
	Safety risk of farmers, risk of livestock theft and theft of farming infrastructure.	Negative low	Negative low	• The proposed construction site for the Mooiwater SEF should be clearly fenced off and the movement of construction workers should be limited to the vicinity of the construction site. • The project proponent/appointed contractors should provide transportation to the construction workers on a daily basis. This will ensure

				the potential risk regarding the trespassing of construction workers on farmers' properties, be reduced. • No staff should be accommodated over-night on the construction site, except for the presence of security staff throughout the night on site. • The project proponent should hold the appointed contractors liable for the compensation to farmers for any damages or losses that can be associated with the construction phase of the proposed project. This should also be included in the code of conduct signed by all key stakeholders. • Procedures regarding waste management on the construction site should be clearly outlined in the Environmental Management Programme (EMPr), to reduce the risk it poses to livestock.
	Increased risk of potential veld fires	Negative medium	Negative medium	• Controlled firebreaks must be implemented by the contractor around the perimeters of the construction site. • No construction staff should be accommodated on the site over-night except for the presence of security personnel. • No smoking should be permitted on the site. • The appointed contractor should ensure that no open fires for the use of cooking or heating should be allowed, except for designated areas. • Adequate fire-fighting equipment should be provided by the contractors and should be readily available and serviced on a regular basis. Additionally, all staff should be training in fire-fighting and how to use the related fire-fighting equipment.

				• The appointed contractors should ensure that any construction related activities that might pose potential fire risks, for example welding and grinding, are confined to the designated areas and that it is properly managed. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months.
	Potential impact of heavy vehicles and construction related activities, damage to roads and dust pollution.	Negative low	Negative low	• The movement of construction vehicles on the site should be confined to agreed access road/s. • The movement of construction vehicles on the site should be confined to agreed access road/s. • All damages to the roads must be repaired by the contractor during the construction phase, and the costs associated with the damage must be borne by the contractor. • Measures for dust suppression should be implemented on a regular basis to minimize potential dust pollution. Examples of measures include wetting of gravel roads. • Vehicles that are used for the transportation of loose building materials, for example sand, should be fitted with covers to avoid any spillage. • The appointed contractors should ensure that all vehicles are road-worthy and that the drivers of all vehicles have the relevant licensing documents. The drivers must be made aware of the speed limits and potential road safety issues.

				• All vehicles related to the construction related activities should adhere to the speed limits.
Traffic Impact Assessment (Appendix E9)	Increase in traffic volumes, for both light and heavy vehicles, influencing traffic congestion and road safety	Negative Low	N/A	• All operations and maintenance vehicles must be roadworthy, and drivers must have the relevant licences 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 facility. The potential impacts will take place over a period of 20 – 30 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- LN2 - Activity 1 (GN.R. 327): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*

- LN3 - Activity 10 (b)(i)(ee) (GN.R 325): *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (b) Free State, (i) Outside urban areas, (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the Competent Authority or in bioregional plans."*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 25-year period. Table 6.4 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment (Appendix E2)	Continued fragmentation and degradation of natural habitats and ecosystems (including wetlands).	Negative medium	Negative low	● All 'Very High' SEI habitats are to be avoided and declared No-Go. Demarcate work areas during the construction phase to avoid affecting outside surrounding areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. These areas should be conserved and allow natural ecosystem processes to continue as normal. ● Avoid the disturbance or destruction of High SEI areas , as far as possible. ● The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. Indigenous vegetation to be maintained under the solar panels as much as possible to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). ● Existing access routes, especially roads, must be made use of. ● A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill

				out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site: ● Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. ● No servicing of equipment on site unless necessary. ● All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. ● Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. ● Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. ● All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. ● It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.

				• Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the Project site. • Any individual of the protected trees/plants that were observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants should be avoided. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. • Compile and implement a rehabilitation plan from the onset of the project. Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover. • Any woody material removed, if necessary, can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion or could be sustainably provided to the surrounding communities. • Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted.

				Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. ● Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. ● The continual usage of the same roadways, parking areas and walkways, and the following of speed limits; ● The responsible management of all waste; and ● An IAP management and habitat rehabilitation plan must be implemented and updated annually
	Continuing spread of IAP and weed species.	Negative medium	Negative low	● An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changes in IAP composition. ● Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests

				and waste must not be allowed to enter surrounding areas. ● A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC. ● The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.
	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	Negative medium	Negative low	● No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard. ● All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. ● Schedule activities and operations during least sensitive periods. ● All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. ● The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of

				staff or any individual into the surrounding environments, signs must be put up to enforce this. ● Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. ● Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. ● Use environmentally friendly cleaning and dust suppressant products.
Wetland Impact Assessment (Appendix E3)	Degradation of the ecological condition of aquatic ecosystems; modification of flow and water quality; erosion; and alien vegetation invasion in aquatic features	Negative Medium	Negative Low	● Alien plant growth and signs of erosion should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants or eroded. Observed invasive alien plant growth should be cleared from the sites regularly according to measures as laid out in the EMPr for the project. ● Stormwater runoff infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping with berms, channels and swales.

				• Should any erosion features develop, they should be stabilised as soon as possible. • Any water supply, sanitation services as well as solid waste management services required for the sites should preferably be provided by an off-site service provider.
Avifaunal Impact Assessment (Appendix E4)	Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive rocky areas, and protected plants).	Negative Medium	Negative Low	• The areas to be developed must be specifically demarcated to prevent movement into surrounding environments. • Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, must under no circumstances be fragmented or disturbed further. • If possible solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity.
	Ongoing displacement and direct mortalities of the avifauna community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching,	Negative Medium	Negative Low	
	Collision with Solar Panels, fencing and any other infrastructure	Negative High	Negative Medium	
	Heat Radiation from the BESS and Solar Panels	Negative Medium	Negative Low	

	Continuing spread of IAP and weed species	Negative Medium	Negative Low	• Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. • Leaking equipment and vehicles must be repaired immediately or be removed from PAOI to facilitate repair.

				• A fire management plan needs to be complied to restrict the impact of fire. • All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species, and owls, which are often persecuted out of superstition. Signs must be put up to enforce this. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40 km/h), to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Fencing mitigations: ➢ Top 2 strands must be smooth wire; ➢ Routinely retention loose wires; ➢ Minimum 300 mm between wires; and ➢ Place markers on fences. • The duration of the construction must be kept to a minimum to avoid disturbing avifauna.

				• Outside lighting must be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) lights should be used wherever possible. • Overhead cables/lines must be fitted with bird diverters or flappers. • All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. • Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure.

				• Use environmentally friendly cleaning and dust suppressant products. • The BESS must be enclosed in a structure with a non-reflective surface. • As far as possible power cables within the PAOI should be thoroughly insulated and preferably buried.
Visual Impact Assessment (Appendix E5)	Alteration to the visual quality of the residents staying on the farms surrounding the study site	Negative medium	Negative low	• Good housekeeping to reduce impacts that could cause a nuisance. ○ Dust suppression • Building should be painted a 'natural' colour. • Vegetate the areas that were exposed during the construction phase. • Retain the vegetation, especially along the boundary of the site
Social Impact Assessment (Appendix E6)	The creation of local employment and business opportunities, as well as opportunities for skills development and on-site training.	Positive medium	Positive medium	• The enhancement measures suggested in the construction phase should have already been implemented prior to the implementation phase. • Skills development programmes and training should be provided and implemented to maximise the number of employment opportunities for the local communities. • The project proponent together with the Local Municipality should explore the option for establishing a Community Development Trust. • The project proponent and the local municipalities, together with the Tourism Centre, need to explore the

				possibility of establishing a visitor centre for the proposed project. • The potential opportunities for local content, procurement as well as community shareholding should be explored and maximised
	The potential up- and downstream economic opportunities for the local community associated with the operational phase	Positive medium	Positive medium	• The enhancement measures suggested in the construction phase presented earlier should have already been implemented prior to the implementation phase. • The project proponent together with the Local Municipality should explore the option for establishing a Community Development Trust. • The project proponent and the local municipalities, together with the Tourism Centre, need to explore the possibility of establishing a visitor centre for the proposed project. • The potential opportunities for local content, procurement as well as community shareholding should be explored and maximised
	The establishment of renewable energy infrastructure and the generation of clean, renewable energy for South Africa	Positive medium	Positive medium	• The establishment of a renewable energy facility like the proposed Mooiwater SEF can be regarded as a mitigation measure itself in terms of the country's high energy demand. • Utilise the proposed Mooiwater SEF to promote and possibly increase the country's contributions towards renewable energy to supply the national energy grid. -

				Implementation of training and skills development programmes by the project proponents for the local communities to maximise the amount of local people employed during the operational phase. • Maximise the exposure of the proposed Mooiwater SEF to the public through extensive communication, advertisement and the establishment of a visitor centre
	The generation of additional income for landowners representing a significant benefit for the affected farmer	Positive low	Positive medium	• Lease agreements between the project proponent and the affected landowners should be implemented.
	The potential positive impacts associated with the establishment of a Community Trust.	Positive medium	Positive medium	• The potential trustees to sit on a Community Trust need to be identified with the assistance of the Local Municipality. The structure of this trust and the trustees also need to be established to ensure that the Trust is also not mismanaged. • There should be clear criteria for the identification and funding of projects/initiatives in the area; the benefits of projects should be aimed at the whole community. • There must be strict financial management controls in place to manage the funds generated for a Community Trust for the proposed SEF financial management controls that could be implemented can include annual audits

	Visual impact and impact on sense of place.	Negative medium		Negative low		• The recommendations contained in the Visual Impact Assessment (VIA) report should be consulted and implemented during the operational phase. The measures aimed at addressing the impact of aviation lights at night should specifically also be addressed
	Impact on the tourism industry.	Negative low	Positive low	Negative low	Positive low	• The recommendations contained in the Visual Impact Assessment (VIA) report should be consulted and implemented during the operational phase. • The project proponents should also consider the establishment of a visitor centre for the proposed Mooiwater SEF.
	Potential loss of productive farmland.	Negative low		Negative low		• The proposed mitigation measures for the construction phase should have been implemented. • The project proponents should consider the establishment of a rehabilitation fund. This fund can be utilised for the rehabilitation of the proposed SEF in the decommissioning phase
Traffic Impact Assessment (Appendix E9)	Increase in traffic volumes, for both light and heavy vehicles, influencing traffic congestion and road safety	Negative Low		N/A		• All operations and maintenance vehicles must be roadworthy, and drivers must have the relevant licences for the type of vehicles they are operating, and • All vehicle drivers need to strictly adhere to the rules of the road.

6.2.3 Impacts During the Decommissioning Phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. Table 6.5 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 6.6: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Wetland Impact Assessment (Appendix E3)	Disturbance of aquatic habitat; water quality impacts wetlands	Negative low	Negative low	• The recommended buffers between the delineated aquatic ecosystems and all the proposed project activities should be maintained. • Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. • The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance. • During the decommissioning phase, site management must be undertaken. This should specifically address on-site stormwater management and prevention of pollution from any potential pollution sources during activities such as hydrocarbon spills. • Any stormwater that does arise within the site must be handled appropriately to trap sediments and reduce flow velocities.

Visual Impact Assessment
 	
(Appendix E5)
	Alteration to the visual quality of the residents staying on the farms surrounding the study site	Negative low	Negative low	• Good housekeeping to reduce impacts that could cause a nuisance.
				  ○ Dust suppression
				  ○ Proper waste collection
				  ○ Neat stockpiling of material.

				• Vegetate the areas that were exposed during the construction phase
Social Impact Assessment (Appendix E6)	The loss of employment opportunities and associated income.	Negative medium	Negative low	• An Environmental Rehabilitation Trust Fund should be established to cover all the costs associated with the decommissioning phase and the rehabilitation of the impacted areas. The funds should be funded by a percentage of the revenue generated from the sale of the energy to the national grid over the 20–25 years lifespan of the proposed SEF.
Traffic Impact Assessment (Appendix E9)	Increase in traffic influencing traffic congestion and road safe	Negative Low	N/A	• All operations and maintenance vehicles must be roadworthy, and drivers must have the relevant licences for the type of vehicles they are operating, and • All vehicle drivers need to strictly adhere to the rules of the road.

6.2.4 Impacts Associated with the Battery Energy Storage System (BESS)

Table 6.7: Impacts associated with the BESS

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
General Environment (risks associated with BESS)	Mechanical breakdown / Exposure to high temperatures Fires, electrocutions and spillage of toxic substances into the	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.

	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			○ 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.

	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.

6.3 SUMMARY OF IMPACTS AND RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- Terrestrial Biodiversity Impact Assessment – The Biodiversity Company (see Appendix E2)
- Wetland Impact Assessment – Toni Belcher (see Appendix E3)
- Agricultural Compliance Statement – The Biodiversity Company (see Appendix E1)
- Avifaunal Site Sensitivity Verification The Biodiversity Company (see Appendix E4)
- Visual Impact Assessment – Green Tree Environmental Consulting (see Appendix E5)
- Heritage Impact Assessment – CTS Heritage (see Appendix E7)
- Traffic Impact Assessment – Bvi Consulting (See Appendix E9)
- Social Impact Assessment – Solis-Environmental (see Appendix E6)
- Palaeontological Impact Assessment – CTS Heritage (see Appendix E8)

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

6.3.1 Heritage and archaeological impacts

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

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

The HIA survey proceeded with no major constraints and limitations, and the project area was comprehensively surveyed for heritage resources, and a number of significant archaeological material remains were documented. The significant heritage resources identified within the development area relate to the agricultural past and burial grounds and graves.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain body fossils or too young and friable to preserve fossils. Furthermore, the material to be excavated are soils and sands and they do not preserve fossils. Since there is an extremely small chance that fossils from below ground may be disturbed, a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

6.3.2 Terrestrial Biodiversity Impacts

The potential impact of the proposed development on 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?

The project area has been altered both currently and historically. The current agricultural and livestock as well as other land uses have had an impact on both the fauna and the flora in the area with the ridge and sandy woodland habitat still present being impacted on in some way or another.

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

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

The PV project is expected to have an overall low residual impact. If mitigation measures as described in this report are implemented, it will reduce the significance of the risk to an acceptable level.

There are areas within the PAOI that possess a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. The maintenance of basal vegetation cover beneath the solar panels will contribute to achieving avoidance, so complete clearance is not recommended. Project planning and layout considered provides favourable avoidance mitigation. The overall low cumulative residual impact does not present a fatal flaw for the development, and in accordance with the Biodiversity Offset Guideline (2022) will not incur a listed (and notable) change to the land and resource. Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the proposed project, may be favourably considered on condition that all prescribed mitigation measures and supporting recommendations are implemented.

6.3.3 Wetland and Aquatic Impacts

The potential impact of the proposed development on wetlands and riparian areas had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on wetlands?"

According to the Wetland and Aquatic Impact Assessment (Appendix E3), the aquatic features occurring within the site comprise a minor watercourse and seasonal seep wetlands that have been largely to seriously modified and are of moderate to low ecological importance and sensitivity. Most of the potential aquatic ecosystem impacts of the proposed activities are likely to take place during the construction phase. The potential aquatic biodiversity impacts of the proposed activities are likely to be very low in terms of any potential impact on aquatic habitat, biota, water quality, or flow for all phases of the proposed developments if mitigated as recommended. A low potential aquatic ecosystem impact is likely if it is only the PV modules and minor support infrastructure (upgrade to existing road, fencing or internal electrical reticulation) placed within these areas that has limited disturbance, is adequately mitigated to reduce surface and subsurface flows and is rehabilitated after the disturbance activities. No hard structures with foundations should be placed in these areas.

Construction of the Mooiwater Solar PV1 Facilities and associated infrastructure will require disturbance of the surface area and some removal of vegetation cover for the preparation of the various project component footprints at the site. Only a limited amount of water is utilised during construction. Concrete foundations will need to be constructed. A construction camp with a temporary laydown area and the concrete batching plant would likely need to be placed within the site for the construction works. There is thus also the potential for some water quality impacts associated with the batching of concrete from hydrocarbon spills or associated with the other construction activities on the site. The location of the works should be located sufficiently far from the delineated aquatic features (outside the recommended setback areas) that they do not pose any significant risk to the aquatic features.

During the operation phase, the PV Facility will operate largely unattended and with low maintenance required for more than 20 years. The hard surfaces created by the developments may lead to increased runoff, in particular on surfaces with a steeper gradient. This may lead to increased erosion and sedimentation of the downslope areas. A localised long-term impact (more than 20 years) of low intensity could be expected that would have a very low overall significance post-mitigation in terms of its impact on the identified aquatic ecosystems in the area. The only potentially toxic or hazardous materials which would be present in relatively small amounts would be lubricating oils and hydraulic and insulating fluids. Therefore, contamination of surface or groundwater or soils is highly unlikely. There are low to no water consumption impacts associated with the operation of the proposed PV infrastructure.

Removal of the Mooiwater Solar PV1 Facilities and associated infrastructure will result in some disturbance of the site. There is thus also the potential for some water quality impacts associated with decommissioning and rehabilitation of the site. The location of the works should be located sufficiently

far from the delineated aquatic features (outside the recommended setback areas) that they do not pose any significant risk to the aquatic features.

Based on the findings of the wetland and aquatic biodiversity assessment report, there should be no reason why the proposed PV facilities and their associated activities, with the recommended mitigation, cannot be approved from an aquatic ecosystem point of view if mitigated as recommended.

6.3.4 Visual Impacts

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

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

The Visual Impact Assessment (Appendix E5) has confirmed that the existing visual condition of the landscape that may be affected by the proposed Project has been described. The study areas scenic quality has been rated moderate within the context of the sub-region and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the proposed development within a 10 km radius of the project site (Zone of potential Influence).

Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or travel routes, and important cultural features and historic sites, especially in foreground views. Sensitivity to the project was considered to be high primarily due to the distance of the viewers to the project, and the change it will bring in their immediate foreground views.

The proposed project will be contrasting to the existing land use and will not be absorbed by the surrounding landscape. It will therefore be in the foreground view of residents staying along the north-eastern, west and southern boundary of the project site and the visibility and the intrusion of the project was considered to be high for these sensitive viewers. Viewers that are not located within the direct vicinity (0 – 3km) of the project site will not experience a high visual impact since the topography and the vegetation in the surrounding area will partially obstruct views towards the project site. The project will be visible from elevated areas.

During construction the significance of visual impact will be negative low and will increase to negative moderate as the Project enters the operational phase. The significance during the construction period could however become moderate if the mitigation measures are not implemented, this is mainly due to the nuisances that are created by vehicles driving up and down, dust, waste on site and the site or construction yard. The negative moderate impact experienced during the operational phase can be reduced to negative low, should the mitigation measures be implemented successfully. During the decommissioning phase the structures will be removed, and rehabilitation will take place. The impact

will be negative low during the decommissioning but could result in a low positive impact, should rehabilitation be successful.

Mitigation measures are viable and includes measures such as good housing keeping and retaining the dense vegetation cover, especially along the boundary of the project area. Therefore, with the mitigation measures in place the significance of the visual impact will be of an acceptable level. Although the proposed project will be visually intrusive and result in a negative visual impact the project will have a positive impact on the social, economic, and future sustainable development within the area. Based on the Visual Impact Assessment it is of the opinion of the Specialist that the project be approved, provided that the mitigation measures are implemented.

6.3.5 Traffic Impact

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

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

According to the Traffic Impact Assessment (Appendix E9), The existing traffic volumes on the transportation routes were sourced from permanent count stations only, as this is the most reliable and accurate data that was available. The impact of the construction, operation, and decommissioning trip generation, on the future background traffic volumes near the Mooiwater SPP and along transportation routes, are expected to be low. Two possible ports of entry have been identified from where the solar panel technology and large electrical components will be transported, namely: Durban and Richards Bay. Based on the shortest travel distance and attractiveness based on travel time, it is recommended that the Port of Durban be the preferred port of entry. All construction materials and solar modules will be transported via normal loads. Transformer and substation components will be transported via abnormal loads. The access point to the site is situated off the R76. The formalisation of this access point, to the standard, might be a requirement as part of the wayleave approval of the Moqhaka Local Municipality. All internal roads considered should conform to the geometric and pavement design parameters as indicated on the design standard certificate. Adequate traffic accommodation signage must be erected and maintained on either side of the access, on the R76, throughout the construction phase of the Mooiwater SPP. In addition, traffic accommodation signage should also be erected at affected major intersections on the transportation routes. The direct impact and significance of the Mooiwater SPP is considered negative low. Therefore, the development of the Mooiwater SPP, can be supported from a traffic perspective.

7 CUMULATIVE EFFECTS ASSESSMENT

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

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

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

7.1 INTRODUCTION

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

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

7.2 GEOGRAPHIC AREA OF EVALUATION

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

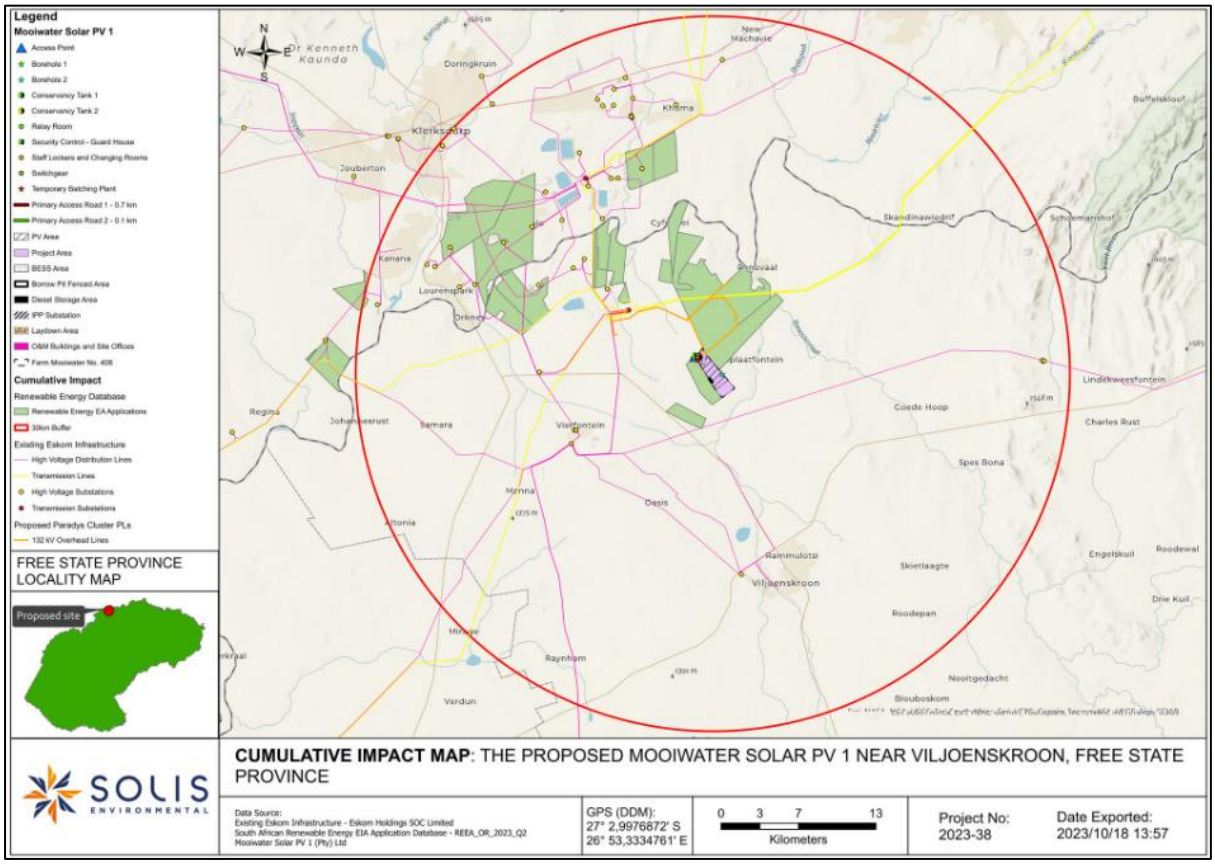

Figure 7.1: Mooiwater Solar PV1 geographic area of evaluation with utility-scale renewable energy generation sites and power lines

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 30 km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Free State Provinces. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 TEMPORAL BOUNDARY OF EVALUATION

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

7.4 OTHER PROJECTS IN THE AREA

7.4.1 Existing projects in the area

According to the DFFE's database, 16 solar PV facility 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 Mooiwater Solar PV1 site.

Site name	Distance from study area	Proposed generating capacity	DFFE reference	EIA process	Project status
Noko solar plant near Orkney, North West Province	29km	20MW	14/12/16/3/3/1/2474	BAR	Approve
Nyarhi solar power plant near Viljoenskroon,Free State Province	7km	100MW	14/12/16/3/3/1/2533	BAR	Approve
Paleso solar power plant near Viljoenskroon situated within the Moqhaka local municipality, the Greater Fezile Dabi District Municipality in the Free State Province	14km	150MW	14/12/16/3/3/1/2365	BAR	Approved
The remaining extent of portion 1 of the farm Grootdraai 468,	13km	150MW	14/12/16/3/3/2/1/2369	BAR	Approved

registration division Viljoenskroon situated within Moqhaka local municipality and the Greater Fezile FS					
Buffels Solar PV1 Solar Energy Project on a site near Orkney, North West Province	15km	75MW	14/12/16/3/3/2/777	Scoping and EIA	Approved
Portion 5 and 57 within the City of Matlosana Local Municipality.	15km	100MW	14/12/16/3/3/2/778	Scoping and EIA	Approved
Grootvaders Bosch No. 592 and Anglo No. 593, Registration Division Viljoenskroon, Free State Province	9.5km	150MW	14/12/16/3/3/1/2476	Scoping and EIA	Approved
Portion 23 of the Farm Pretorius Kraal No. 53, Registration Division Viljoenskroon, Free State Province	14,5km	150MW	14/12/16/3/3/1/2535	Scoping and EIA	Approved
Portion 3 of the Farm Tweepunt No. 14, Registration Division Viljoenskroon, Free State Province	2,5km	129MW	14/12/16/3/3/1/2543	Scoping and EIA	Approved

Portion 1 of the Farm Waterford No. 53, Registration Division Viljoenskroon, Free State Province	5km	300MW	14/12/16/3/3/1/2698	Scoping and EIA	Approved
Portion 2 of the Farm Waterford No. 53, Registration Division Viljoenskroon, Free State Province	3km	200MW	14/12/16/3/3/1/2705	Scoping and EIA	Approved
The Remaining Extent of the Farm Cijfervlei 6 and Portion 1 of the Farm La Reys Kraal Zuid 165	6km	250MW	14/12/16/3/3/1/2707	Scoping and EIA	Approved
Paradys Solar PV1	0km	240MW	14/12/16/3/3/1/2831	Scoping and EIA	In process
Utopia Solar PV1	3.5km	250MW	14/12/16/3/3/1/2829	Scoping and EIA	In process
Witfontein Solar PV 1	0km	180MW	14/12/16/3/3/1/2828	Scoping and EIA	In process
Rudolph Solar PV1	4km	200MW	14/12/16/3/3/1/2830	Scoping and EIA	In process

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

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed

development and other projects which are either developed or in the process of being developed in the local area (refer to Figure 7.2 for process flow). The following sections present their findings.

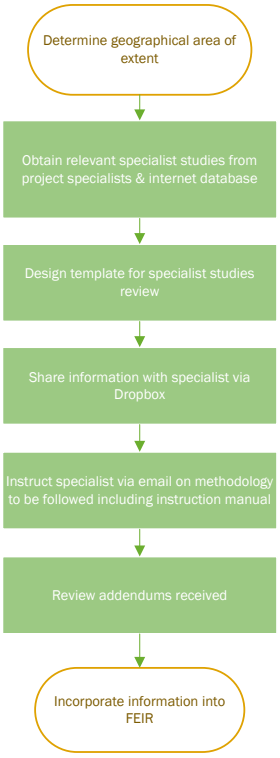

Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Soil, Land Capability and Agricultural Potential

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 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?

The cumulative impact assessment has considered all renewable energy projects within a 30 km radius. In quantifying the cumulative impact, the area of land taken out of agricultural use as a result of all the projects listed (total generation capacity of 2744 MW) will amount to a total of approximately 6860 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 30 km radius (approximately 282,700 ha), this amounts to 2.43% of the surface area. This is within an acceptable limit in terms of loss of low potential agricultural land which is only

suitable for grazing, and of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

Few competing land uses beyond renewable energy exist in this region, minimizing cumulative impacts. The loss of agricultural potential due to soil degradation in renewable energy projects can be prevented through inherent engineering measures and standard practices. Thus, cumulative soil degradation risk is low. Considering all factors, the cumulative loss of future agricultural production potential is deemed low, with no unacceptable negative effect. Approval of the development is recommended, considering cumulative agricultural impacts.

7.5.2 Terrestrial Biodiversity Impact Assessment

The Terrestrial Biodiversity Impact Assessment (Appendix E2) indicates that the total area within the 30 km buffer around the PV development area amounts to 371053,18 ha, but when considering the transformation (232113,78 ha) that has taken place within this radius, 138939,40 ha of intact habitat remains according to the RLE. Therefore, the area within 30 km of the project has experienced approximately 62.56% loss in natural habitat.

Considering this context, the PV cluster footprint[4] for is 4276.55 ha and similar projects exists in the 30 km region measuring a maximum of 9050.86 ha (as per the latest South African Renewable Energy EIA Application Database) which means that the total amount of remaining habitat lost as a result of the solar project amounts to 9.59% (PV developments as a percentage of the total remaining habitat). Due to the significant (62.56%) amount of the local vegetation type has already been lost, the overall cumulative impact of the proposed cluster project is rated as 'high'. Considering the Mooiwater PV, the area is 466 ha, will contribute 0.90 % in the cumulative impact.

7.5.3 Wetland Riparian Impact Assessment

The Wetland Impact Assessment (Appendix E3) indicates that the potential cumulative aquatic ecosystem impacts of the proposed development relate to the combined impact of that development with the incremental impacts of other past, present or reasonably foreseeable future activities on the same aquatic ecosystems (i.e. a small unnamed watercourse and several seeps). These impacts have been assessed within an area of a 30km radius surrounding the proposed development and for the anticipated project lifetime of at least 20 years, where the greatest potential impact is likely to occur for overlapping construction activities. For the study area, from a surface water perspective, the site lies within the catchments of Vaal River tributaries in C70K (Olifantsvlei and Renoster) and the greater Vaal River. These aquatic ecosystems are in a moderately to largely modified ecological condition with a moderate to high ecological importance and ecological sensitivities as a result of the current activities and their cumulative impact on them. The REC of these features would be that they at least remain in a moderate or largely modified ecological condition and are rehabilitated where the opportunity occurs. The proposed activities associated with the projects have been mitigated to ensure that there is no further degradation of these aquatic ecosystems and that the Recommended

[4] Considering the whole cluster area is developed.

Ecological Condition (REC) is achievable. There would be no net loss of aquatic habitat or functionality as a result of the cumulative impact associated with this project. In terms of the renewable energy projects in a 30km radius, None of these activities would impact further on the mentioned aquatic ecosystems than those activities assessed in this section as they are located far from these aquatic ecosystems and would also not result in any net loss of these aquatic ecosystems.

Due to all of the considerations discussed above, the cumulative impact on aquatic ecosystem habitat, integrity and functionality in the area will not have an unacceptable negative impact. The proposed project is therefore acceptable in terms of its associated cumulative impact, and therefore from this perspective, there is no reason why it should not be approved.

7.5.4 Avifaunal Assessment

The Avifauna Impact Assessment Report (Appendix E4) describes the potential impacts on avifauna associated with the construction, operational and decommissioning phases of the proposed development. Cumulative impacts were assessed within the context of the extent of the proposed PAOI, other similar developments and activities in the area (existing and in-process), and general habitat loss and transformation resulting from any other activities in the area. Localised cumulative impacts include those from operations that are close enough (within 30 km) to potentially cause additive effects on the local environment or any sensitive receptors (relevant operations include nearby large road networks, other solar PV facilities, agricultural activities, dense urban development, and power infrastructure). Relevant impacts include the overall reduction of foraging and nesting habitat, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, and groundwater and surface water quality depletion. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as regional game parks and reserves. In order to spatially quantify the cumulative effects of the proposed development, the PAOI is compared with the overall effects of surrounding development (including total transformation, and transformation as a result of new and proposed developments of a similar type, i.e., solar). Note that this spatial assessment is only conducted for the proposed solar development footprint area, the powerline area is omitted as it forms part of a separate BA.

7.5.5 Social Impact Assessment

The Social Impact Assessment (Appendix E6) indicates that potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as visual impacts on sense of place.

Mooiwater Solar PV1 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 Mooiwater Solar PV alone. There are negative cumulative impacts regarding the visual impact and sense of place. It is important to note, however, that cumulative impacts need to be considered in relation with dynamic and static viewpoints, and that aesthetic perception regarding the sense of place, are a key determinant of people's attitudes and is subjective of matter. The potential social impact associated with the establishment of an SEF will have a visual impact on the environment and its surroundings, however the impact on the sense of place is likely to be low.

7.5.6 Visual Impact Assessment

The Visual Impact Assessment (Appendix E5) indicates that construction of the Mooiwater Solar PV1 will have a negative impact on the visual quality of the study area. The project will change the character and the sense of place of the area, which can still be absorbed within the landscape, but should there be more than just this project, the landscape will not be able to absorb the impact. The addition of more than one Solar PV Plant will bring a complete change and loss of the visual quality in the area. The proposed Project, together with the planned Solar PV Plants, will contribute to a negative cumulative impact that will completely change the visual quality and sense of place of the area.

7.5.7 Heritage and Paleontological Impact Assessment

In terms of cumulative impacts to heritage resources, impacts to archaeological and palaeontological resources are sufficiently dealt with on a case by case basis. The primary concern from a cumulative impact perspective. would be to the cultural landscape. The cultural landscape is defined as the interaction between people and the places that they have occupied and impacted. In some places in South Africa, the cultural landscape can be more than 1 million years old where we find evidence of Early Stone Age archaeology (up to 2 million years old), Middle Stone Age archaeology (up to 200 000 years old), Later Stone Age archaeology (up to 20 000 years old), evidence of indigenous herder populations (up to 2000 years old) as well as evidence of colonial frontier settlement (up to 300 years old) and more recent agricultural layers.

The landscape within which the proposed project areas are located, is not worthy of formal protection as a heritage resource and has the capacity to accommodate such development from a heritage perspective. The proposed development is located sufficiently far from significant roads and features that impact is unlikely.

7.5.8 Traffic Impact Assessment

Depending on the timing of the other nearby renewable energy projects, where construction could overlap, traffic impact will increase accordingly. It should be noted that the volume of traffic is related to the specific development stage, logistics planning and development size. The construction period for other renewable energy projects is relatively short (between 12 and 18 months), where traffic flow will vary during the construction period. It is assumed that 50% of these projects' construction periods would likely coincide with the Mooiwater PV construction period since they are most likely to share same access through the R501. This additional traffic, however, will be accommodated on the

surrounding road network mainly the R501 link. 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. The cumulative impact and significance of the various nearby renewable energy projects is considered to have a low / negligible impact and therefore no corrective measures will be required.

7.6 IMPACT ASSESSMENT

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

7.6.1 Potential Cumulative Effects

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

Figure 7.2:Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial Biodiversity Impact Assessment	Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community	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.	- High
Wetland Assessment	Disturbance of aquatic habitat; water quality impacts	Only a limited amount of water is utilised during construction. The location of the any work should be located sufficiently far from the delineated aquatic features (outside the recommended setback/buffer areas) that they	- Low

		do not pose any significant risk to the aquatic features.	
Avifaunal Impact Assessment	Displacement of priority avian species from important habitats	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- High
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	In terms of cumulative impacts to heritage resources, impacts to archaeological and palaeontological resources are sufficiently dealt with on a case by case basis. The primary concern from a cumulative impact perspective would be to the cultural landscape. The cultural landscape is defined as the interaction between people and the places that they have occupied and impacted. In some places in South Africa, the cultural landscape can be more than 1 million years old where we find evidence of Early Stone Age archaeology (up to 2 million years old), Middle Stone Age archaeology (up to 200 000 years old), Later Stone Age archaeology (up to 20 000 years old), evidence of indigenous herder populations (up to 2000 years old) as well as evidence of colonial frontier settlement (up to 300 years old) and more recent agricultural layers. This proposed development is located within an identified REDZ. Modern interventions into such	- Medium

		landscapes, such as renewable energy development, constitute an additional layer onto the cultural landscape which must be acceptable in REDZ areas. The primary risk in terms of negative impact to the cultural landscape resulting from renewable energy development lies in the eradication of older layers that make up the cultural landscape. There are various ways that such impact can be mitigated. In terms of impacts to heritage resources, it is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise agricultural landscape. The proposed development is therefore unlikely to result in unacceptable risk or loss, as the proposed development is located within a REDZ area. The landscape within which the proposed project areas are located, is not worthy of formal protection as a heritage resource and has the capacity to accommodate such development from a heritage perspective. The proposed development is located sufciently far from significant roads and features that impact is unlikely.	
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 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 Assessmen	Potential social benefits and impact on local economy	The proposed establishment of the Mooiwater SEF as a suitable sited renewable energy facility situated within the Local Municipality in the Free State Province of South Africa should be	+ Medium

		supported and developed. The enhancement and mitigation measures proposed in this SIA report and other specialist studies for the Mooiwater SEF should be implemented.	
	Visual impact and impact on sense of place	The final placement of the solar panels of the proposed Mooiwater SEF should be communicated to the affected landowner; Environmental Authorities should consider the overall cumulative impacts on the sense of place and consult the recommendations made in the Visual Impact Assessment (VIA) specialist report in this regard, and implement those recommendations made, before a final placement decision is made.	-Medium
	Establishment of number of renewable energy facilities may potentially place pressure on local services	It is suggested that the development of renewable energy facilities in the region should be coordinated and managed as this will provide the opportunity to effectively mitigate the negative impacts and enhance positive impacts associated with such developments. This will also assist in the issues raised in the Integrated Development Plans (IDPs) of the Local Municipality and to address those issues related to local service delivery	Negative Low
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	- Low

		roads are staggered and staged to ensure that the impact will be acceptable.	
Operational Phase			
Terrestrial Biodiversity Impact Assessment	Continued fragmentation and degradation of natural habitats and ecosystems (including wetlands).	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.	- High
	Encroachment of invasive alien species in disturbed areas	Continued movement of vehicles on and off the site will result in a risk of importation of alien species. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. Movement of vehicles will however be reduced during operation and maintenance of the facility.	- Low
Wetland/Riparian Assessment	Disturbance of aquatic habitat; water quality impacts	During the operation phase, the PV Facility will operate largely unattended and with low maintenance required for more than 20 years. The hard surfaces created by the developments may lead to increased runoff, in particular on surfaces with a steeper gradient. This may lead to increased erosion and sedimentation of the downslope areas. A localised long-term impact (more than 20 years) of low intensity could be expected that would have a very low overall significance post-mitigation in terms of its	-Low

		impact on the identified aquatic ecosystems in the area. The only potentially toxic or hazardous materials which would be present in relatively small amounts would be lubricating oils and hydraulic and insulating fluids. Therefore, contamination of surface or groundwater or soils is highly unlikely. There are low to no water consumption impacts associated with the operation of the proposed PV infrastructure.	
Visual Impact Assessment	Visual intrusion of the development on observers within the area	The operation and maintenance of the facility will create visual instruction on observers that utilise and travel through the area, including travellers using the local roads	- Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium

7.7 CONCLUSION

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

The potential most significant cumulative impacts relate to:

- <u>Cumulative effects during construction phase:</u>
    - Loss of habitat including flora species, degradation of habitats in general, encroachment of invasive alien species in disturbed areas, direct mortality of fauna and emigration of fauna (- High)
    - Displacement of priority avian species from important habitats (- High)
    - Destruction of significant archaeological and palaeontological heritage (- Medium)
    - Potential social benefits and impact on local economy (+High)

- Cumulative effects during the operational phase:

  - of habitat including flora species, degradation of habitats in general, encroachment of invasive alien species in disturbed areas, direct mortality of fauna and emigration of fauna (- High)
  - Visual intrusion Visual impact and impact on sense of place (- Medium)
  - Impact on wetland features

- Cumulative effects during the decommissioning phase:

  - Generation of waste

The cumulative impact for the proposed development is high to low, unacceptable impacts related to the project are expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment.

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

In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this 1 (where the landscape has already experienced degradation), than to lose land with a higher environmental value elsewhere in the country.

8 ENVIRONMENTAL IMPACT STATEMENT

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

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

(l) an environmental impact statement which contains-

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

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

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

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

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

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

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

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which have been assessed and addressed in this draft BA report. The ratings provided gives an indication of the impact significance with the implementation of the recommended mitigation measures.

- Impacts during the construction phase:
  - Introduction of Invasive Alien Plant (IAP) species and invasive fauna (- Medium)
  - Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop habitats in certain areas), ecosystems and the vegetation community (including protected plants) (- Very High)
  - Displacement of the indigenous faunal community (- Medium)

- Displacement of the indigenous avifauna communities (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching) (- Medium).
- Direct mortality from persecution or poaching of avifauna species and collection of eggs (- Medium)
- Destruction of significant archaeological and palaeontological heritage (- Medium)
- The creation of local employment and business opportunities, as well as opportunities for skills development and on-site training (+ High)
- The potential maximising of opportunities to local and regional SMMEs and other businesses for service delivery (+ Medium)
- Increased risk of potential veld fires (- Medium)

➢ <u>Impacts during the operational phase:</u>

- Continued fragmentation and degradation of natural habitats and ecosystems (- Medium)
- Continuing spread of IAP and weed species (- Medium)
- Ongoing displacement and direct mortalities of the faunal community (- Medium)
- Ongoing displacement and direct mortalities of the avifauna community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.) (- Medium)
- Collision with Solar Panels, fencing and any other infrastructure (- Medium)
- Heat Radiation from the BESS and Solar Panels (- Medium)
- The creation of local employment and business opportunities, as well as opportunities for skills development and on-site training (+ Medium)
- The potential up- and downstream economic opportunities for the impacted community (+ Medium)
- The establishment of renewable energy infrastructure and the generation of clean, renewable energy (+Medium)
- The potential positive impacts associated with the establishment of a Community Trust (+ Medium
- Visual impact and impact on sense of place (- Medium)

➢ Impacts during the decommissioning phase:

- The potential loss of employment opportunities and associated income due to the decommissioning of the proposed Mooiwater SEF (- Medium)
- Ongoing displacement and direct mortalities of the avifauna community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.) (- Medium)
- Continuing spread of IAP and weed species (- Medium)

➢ The cumulative impact for the proposed development

- Potential social benefits and impact on local economy (Positive Medium)
- Visual impact and impact on sense of place (Negative Medium)
- Loss of habitat including flora species, degradation of habitats in general, encroachment of invasive alien species in disturbed areas, direct mortality of fauna and emigration of fauna (Negative High)
- Displacement of priority avian species from important habitats (Negative High)
- Destruction of significant archaeological and palaeontological heritage (Negative Medium)

It is important to highlight that no fatal flaws or impacts with unacceptable levels of significance were identified and the impacts from the proposed development are expected to be at an acceptable level with the implementation of mitigation measures. All negative high to medium impacts can be effectively mitigated to negative medium and negative low impacts respectively. Therefore, the project can be authorised subject to the implementation of the recommended mitigation measures.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the final layout of the Mooiwater Solar PV Project 1 through identifying specific environmental areas and features present within the site which needs to be avoided through the careful placement of infrastructure as part of the development footprint. Refer to Section 6.4 for the complete sensitivity analysis and Appendix H for the preferred layout map.

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

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- PV Panel Array - To produce up to 150MW the facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the

solar PV arrays which will comprise the PV facility. The tracking system will follow the sun from east to west during the day, maximising the amount of solar radiation falling onto the surface on the panels, thereby maximising their yield.

- 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 the transformation of the voltage from 33kV to 132kV. The normal components and dimensions of a distribution-rated electrical substation will be required. A collector substation with a capacity of 33kV/132kV will also be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the proposed power line. It is expected that generation from. the facility will connect to the national grid. Corridor will cover options to connect to the Mercury Substation or the Zaaiplaats Solar PV1 collector substation (a planned substation, under development by Mulilo, that forms part of the Mercury Solar PV cluster).

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain 1.5 m underground as far as practically possible.

- Battery Storage- Facilities with a maximum height of 5m and a capacity of 2500MWh will be installed in a 6-hectare area

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:

    - Operations & Maintenance Building / Office
    - Switch gear and relay room
    - Staff lockers and changing room
    - Security control
    - Offices
    - Ablutions with conservancy tanks
    - Construction camps (on laydown area)
    - Workshop (Part of O&M Buildings)
    - Temporary sanitation facilities during construction
    - Storage Warehouse (Part of O&M Buildings)

- Disel Storage Area

- Roads –Access is most likely to be obtained via R76 and R501 Regional Road. This will be confirmed in the Traffic Impact Assessment which has been commissioned. An internal site road network will also be required to provide access to the solar field and associated infrastructure.

- Battery storage – The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 2500MWh. Battery Storage Facilities will have a maximum height of up to 5m and will be installed in a 4.5-hectare area.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farms. Fencing with a height of 3-4.5 meters will be used.

8.4 RECOMMENDATION OF EAP

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

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended)

- The Amended Basic Assessment process has been conducted as required by the EIA Regulations (as amended), Regulations 19 and Appendix 1. The EMPr was compiled in conjunction with the Generic EMPr for the development of the associated substation infrastructure for transmission and distribution of electricity as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.

- The EMPr was compiled for the Mooiwater Solar PV Project 1 as per Appendix 4 of the EIA Regulations (GN.R. 326), published in Government Gazette 40772 on 07 April 2017.

- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.

In terms of the contents and substance of the BA report the EAP is confident that all key environmental issues were identified, assessed and appropriate mitigation measures recommended for the reduction of the impact significance expected to occur. These key issues have been adequately assessed during the BA process to provide the competent authority and registered I&APs with sufficient information to allow them to provide comment and raise any further potential issues.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically in an area which has been transformed through historical agricultural

and mining activities. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures.

Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Mooiwater Solar PV Project 1 and associated infrastructure on the Remaining Extent of the Farm Mooiwater No. 408, Viljoenskroon, Free State Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr(s).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPr(s) should not be neglected and a copy of the EMPr(s) should be made available onsite at all times.
- A detailed Geotechnical Assessment must be undertaken for the development footprint as part of the micro-siting of the layout.

Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitionor so that an investigation and evaluation of the finds can be made.

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

Solis-Enviromental Consultants

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