ENVIRONMENTAL IMPACT REPORT

Draft – 23 June 2023

THE PROPOSED ROOIDRAAI SOLAR PHOTOVOLTAIC SOLAR ENERGY FACILITY AND GRID CONNECTION INFRASTRUCTURE NEAR CARLETONVILLE NORTH WEST PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	:	14/12/16/3/3/2/2344
Project Title	:	Proposed Rooidraai Solar Photovoltaic Solar Energy Facility and Grid Connection Infrastructure near Carletonville, North West Province
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Client	:	Rooidraai Solar (Pty) Ltd
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PLATES

APPENDICES

Appendix A: EAP declaration & Curriculum Vitae

Appendix B: Screening report

Appendix C: Public Participation

- Appendix C1: Pre-application meeting
- Appendix C2: Press advertisement
- Appendix C3: On site notice
- Appendix C4: List of I&APs
- Appendix C5: Proof of correspondence
- Appendix C6: Written comment received
- Appendix C7: Comments and Responses Report

Appendix D: Site verification report

Appendix E: Specialist Reports

- Appendix E1: Aquatic Ecological Assessment
- Appendix E2: Terrestrial and Aquatic Ecological Screening
- Appendix E3: Avifaunal Impact Assessment
- Appendix E4: Visual Impact Assessment
- Appendix E5: Agricultural Compliance Statement
- Appendix E6: Heritage Impact Assessment
- Appendix E7: Palaeontological Impact Assessment
- Appendix E8: Social Impact Assessment
- Appendix E9: Traffic Impact Assessment
- Appendix E10: Desktop Geotechnical Assessment
- Appendix E11: Specialist Terms of Reference

Appendix F: Environmental Management Programme (EMPr)

- Appendix F1: Solar PV Facility EMPr
- Appendix F2: Generic EMPr for the Substation
- Appendix F3: Generic EMPr for the OHPL

Appendix G: Additional Information

GLOSSARY OF TERMS AND ACRONYMS

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

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

CONTEXT FOR THE DEVELOPMENT

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

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

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

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, Rooidraai Solar (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located on Reminder of Portion 10 of the Farm Rooidraai No. 85, Registration Division IQ, North West Province situated within the JB Marks Local Municipality area of jurisdiction (refer to Figure A for the locality map). From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2118 kwh/m^2.

The project entails the generation of up to 150 MW electrical power through photovoltaic (PV) technology. The total area assessed comprises of approximately 296 ha proposed for the PV facility (including supporting infrastructure) with an additional 1km long and 100m wide corridor for the grid corridor.

EXECUTIVE SUMMARY

Like many other developing municipalities in the country, the JB Marks Local Municipality faces a number of challenges in addressing the needs of sustainable growth and providing quality services (IDP, 2022-2027). The JB Marks Local Municipality, IDP (2022-2027), has identified specific issues that require special attention including but not limited to poverty; job creation; unemployment; and inequalities.

The JB Marks Local Municipality does not regard the development of an IDP as the only requirement prevailing legislation. Therefore, there are specific reasons why the municipality should prepare the IDP. One of the main reasons is that developmental responsibilities have been prescribed by the Constitution, which is aimed at ensuring quality for the life of the municipality's residents. The responsibility does not only relate to the provision of basic services, but also include economic transformation and job creation; education, skills and health improvement; social cohesion and safe communities within the municipality (IDP, 2022 - 2027). The IDP considers the economic structure and performance and how the municipality relies heavily on the agricultural and mining sector and the general decline of the sector. It indicates that alternative sectors to the declining sectors of the area needs to be explored, which includes the expansion in renewable energy sector with special reference to solar power (IDP, 2022 – 2027).

Rooidraai Solar (Pty) Ltd intends to develop a 150 MW photovoltaic solar facility and associated infrastructure on Reminder of Portion 10 of the Farm Rooidraai No. 85, Registration Division IQ, North West Province situated within the JB Marks Local Municipality and Dr Kenneth Kaunda District Municipality area of jurisdiction. The town of Carletonville is located approximately 19 km south east of the proposed development (refer to Figure A and B for the locality and regional map respectively). The total area assessed comprises of approximately 296 ha proposed for the PV facility (including supporting infrastructure) with an additional 1km long and 100m wide grid assessment corridor. The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., low agricultural potential, low ecological sensitivity and archaeology), proximity to a grid connection point (i.e., for the purpose of electricity evacuation), as well as site access via a main road and existing farm tracks (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*

- Activity 12(ii)(a)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."*
- Activity 19 (GN.R. 327): *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."*
- Activity 24(ii) (GN.R. 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 28(ii) (GN.R. 327): "*Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56(ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R. 325): *" The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more"*
- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*
- Activity 4(h)(iv) (GN.R. 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (h) North West province, (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*
- Activity 10(h)(iv) (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 (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*
- Activity 12(h)(iv)(vi) (GN.R. 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."*
- Activity 14(ii)(a)(c)(h)(iv) (GN.R. 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge*

of a watercourse, (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."

- Activity 18(h)(v)(ix) (GN.R. 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) North West (v) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (ix) 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 facility which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 and 324) implies that the development could potentially have an impact on the environment that will require mitigation. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24 of the EIA Regulations in order to obtain Environmental Authorisation. Environamics has been appointed as the independent consultant to undertake the Scoping and Environmental Impact Reporting (S&EIR) on behalf of Rooidraai Solar (Pty) Ltd.

Regulation 21 of the EIA Regulations requires that an Environmental Impact Report (EIR) must contain the information set out in Appendix 3 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 3 of GN R.326 requires 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 site, the scope of the assessment, and the consultation process undertaken be set out in the EIR report.

It has been determined through the EIA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically where the affected landowner is experiencing challenges and limitations in terms of the current agricultural land use. 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 summarised 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 18-24 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation and socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and temporary increase in traffic disruptions and movement patterns.

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 – 25 years. The negative impacts are generally associated with habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, collision and electrocutions of avifauna and visual impact of sensitive visual receptors located within a 500 m radius of the proposed development and grid

connection. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development and social upliftment.

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 a number of temporary jobs will also be created in the process. It is not expected that the facility will be decommissioned, but rather that the technology used will be upgraded.

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of Forestry, Fisheries and Environment database five (05) other solar plants have been proposed in relatively close proximity to the proposed activity. The potential for cumulative impacts may therefore exist.

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

Regulation 23 of the EIA Regulations determine that an EIA report must be prepared and submitted for the proposed activity after the competent authority accepts the final Scoping Report, including the Plan of Study for the EIA phase. The EIA report will evaluate and rate each identified impact and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Appendix 3 of the EIA Regulations. This is the Draft EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE) for review and commenting on the Application for Environmental Authorisation.

1 INTRODUCTION

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

Appendix 3. (3) An environmental impact assessment report contains the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-(a) details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant Competent Authority (CA), 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 activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 and 324) for the project implies that the development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. According to Appendix 3 of Regulation 326 the objective of the Environmental Impact Report (EIR) is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the—
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

- degree to which these impacts-
  - can be reversed;
  - may cause irreplaceable loss of resources, and
  - can be avoided, managed or mitigated;

- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored

This report is the Draft Environmental Impact Report (EIR) that has been submitted to the Department of Forestry, Fisheries and the Environment for a 30-day review and comment period. According to Regulation 326 all registered I&APs and relevant State Departments must also be allowed the opportunity to review the report. The Draft EIR was made available to registered I&APs and all relevant State Departments for a 30-day review period from 24 June 2023 to 24 July 2023. These stakeholders and individuals were requested to provide written comments on the Draft EIR within the allocated timeframe. All issues identified during the review period will be documented and compiled into a Comments and Response Report as part of the Final EIR (Appendix C7). All comments received prior to and during the Scoping Phase of the project are available in the Comments and Response Report as referred to above, as well as Appendix C5 and C6 of this Draft EIR.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person:	Ms. Carli van Niekerk
EAPASA Registration:	2019/1742
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	082 220 8651 (Cell)
Electronic Mail:	carli@environamics.co.za
And/or	
Contact person:	Austin Sharkey
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	083 747 6717 (Cell)
Electronic Mail:	austin@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the S&EIR 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 S&EIR 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 S&EIR 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 the specialists

Study	Prepared by	Contact Person	Postal Address	Tel	E-mail
Geotechnical Desktop Study	Delta Geotech	Daniel Miller & Mattew Jones	17 Clearview Place, Beacon Bay, East London, 5241	Tel: +27 81 586 7378	mattew@deltageotech.co.za
Avifauna Scoping Report	Pachnoda Consulting CC	Lukas Niemand	PO Box 72847, Potchefstroom 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Terrestrial, Animal and Plant Report	Nkurenkuru Ecology & Biodiversity	Gerhard Botha	-	-	gabotha11@gmail.com
Phase 1 Cultural Heritage Impact Assessment	J A van Schalkwyk	J van Schalkwyk	62 Coetzer Avenue, Monument Park, 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Desktop Assessment	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	info@banzai-group.com
Agricultural Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz	1A Wolfe Street, Wynberg, 7800, Cape Town	Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street, Steynsrus, 9515	Tel: 082 316 7749	johan@donaway.co.za
Social Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street, Steynsrus, 9515	Cell: 082 493 5166	johan@donaway.co.za
Traffic Impact Assessment	iWink Consulting (Pty) Ltd	Iris Wink	Plattekloof Glen	Cell: 082 691 9096	iris@iwink.co.za
Aquatic Ecological Assessment	EnviroSci (Pty) Ltd	Dr Brian Colloty	1 Rossini Road, Pari Park, Gqeberha, 6070	Cell: 083 498 3299	brianc@envirosci.co.za

1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 326. Table 1.2 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted by the EAP on 12 October 2022.
- Site notices were erected on site on 14 October 2022 informing the public of the commencement of the EIA process.
- A newspaper advertisement was placed in the Carletonville Herald on 10 November 2022, informing the public of the EIA process and for the public to register as I&APs.
- The Background Information Document (BID) was circulated to all I&APs and surrounding landowners on 14 November 2022.
- A pre-application meeting request was submitted to DFFE on 16 November 2022.
- It was then confirmed that a pre-application meeting is not required via email dated 22 November 2022.
- An application form and the draft Scoping Report has been submitted to DFFE on 31 March 2023.
- The draft Scoping Report has been made available for a 30-day review and comment period from 31 March 2023 to 04 May 2023.
- The final Scoping Report was submitted to the DFFE on 05 May 2023 for decision-making and approval of the Plan of Study for the EIA.
- The DFFE accepted the Final Scoping Report (FSR) on 14 June 2023.
- The Draft EIR Report was submitted to the DFFE (and registered I&APs) on 23 June 2023 for the 30-day review and comment period which will be from 24 June 2023 to 24 July 2023.

It is envisaged that the S&EIR process should be completed within approximately nine months of submission of the Draft Scoping Report, i.e., by December 2023 – see Table 1.2.

Table 1.2: Estimated timeframe for completion of the 'scoping and EIA process'

Activity	**Prescribed timeframe**	**Timeframe**
Site visit		12 October 2022
Public participation (BID)	30 Days	14 November – 14 December 2022
Submit application form and DSR	-	31 March 2023

Public participation (DSR)	30 Days	31 March 2023 – 04 May 2023
Submit FSR	44 Days	05 May 2023
Department approves/reject	43 Days	14 June 2023
Public participation (DEIR)	30 Days	24 June – 24 July 2023
Submission of FEIR & EMPr	-	August/September 2023
Department acknowledges receipt	10 Days	August/September 2023
Decision	107 Days	December 2023/ January 2024
Department notifies of decision	5 Days	December 2023/ January 2024
Registered I&APs notified of decision	14 Days	December 2023/ January 2024
Appeal	20 Days	January 2024

Table 1.3 below provides more detail on timeframes as well as process flow for the S&EIR process.

Table 1.3: Estimated timeframe for completion of the 'S&EIR processes' for Rooidraai Solar PV facility

Tasks to be performed	October				November				December				January				February				March				April				May				June				July				August				September				October				November			
	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	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
REGISTRATION PHASE																																																							
Pre-application meeting (DFFE							X																																															
Site visits		X																																																			
Public participation																																																					
– Press advertisement						X																																														
– On site advertisement		X																																																		
– Distribution of notices						X																																														
– Complete PP report																X																																					
Specialist inputs and reports																																																					
– Draft terms of reference																																																				
– Receive specialist studies																X																																					
'Draft' Scoping Report																																																				
- Information gathering															X																																						
- Report writing																							X																														
- Circulate 'Draft' Scoping Report																													X																								
SCOPING PHASE																																																				
Complete and submit application																																																				
– Information gathering																			X																																		
– Complete and submit																								X																												
Authority acknowledges receipt of																									X																												
Final Scoping Report																																																				
– Information gathering																																																					
– Report writing																																																					
– Submission of Final Scoping																																																				
– Approval																																																				
EIA PHASE																																																				
Specialist inputs and reports																																																				
– Draft terms of reference																																																				
– Receive specialist studies																																																				
Draft EIR Report																																																				
- Circulate																																																				
Final EIA Report & EMP																																																				
- Submission																																																				

The competent authority has 107 days for decision-making after the EIR 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 5 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 21 – 24 of the EIA Regulations.

The requirement for the submission of a Screening Report for the Rooidraai PV facility is applicable as it triggers Regulation 21 of the EIA Regulations, 2014 (as amended). The Screening Report has been appended to the Application for EA as originally submitted to the DFFE on 31 March 2023. The screening tool reports are also appended as Appendix B to this Draft EIR.

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, **solar PV category** and specialist studies completed

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Appendix
Agricultural Impact Assessment Sensitivity: High	Yes	An Agricultural Compliance Statement is included in Appendix E5 of the Scoping Report.
Animal Species Assessment Sensitivity: High	No	A Terrestrial, Animal and Plant Report as well as an avifaunal assessment will be undertaken during the EIA phase of the project once the required site inspections are undertaken.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High	Yes	An Aquatic Ecological Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Archaeological and Cultural Heritage Impact Assessment	Yes	A Heritage Impact Assessment is included in Appendix E6 of the

Sensitivity: Low		Scoping Report, as per the requirements of the National Heritage Resources Act.
Avian Impact Assessment Sensitivity: High	Yes	An Avifaunal scoping report is included in Appendix E3 as the site is located within 20 km of known Cape Vulture restaurants sites.
Civil Aviation Assessment Sensitivity: Low	No	The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. This is based on the current land use of the site being used for agricultural grazing purposes. The Civil Aviation Authority 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 CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Defence Theme Sensitivity: Low	No	The affected property is confirmed to be used for agricultural grazing purposes and therefore the development will not have any impact on defence installations. The sensitivity for the entire extent of the site is low and therefore no assessment has been included. The South African National Defence Force (SANDF) 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 regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Palaeontological Impact Assessment is included in Appendix E7 of the Scoping Report, as per the requirements of the National Heritage Resources Act.
Plant species Assessment Sensitivity: Medium	No	A Terrestrial, Animal and Plant Report will be undertaken during the EIA phase of the project once the required site inspections are undertaken.
RFI Assessment Sensitivity: Low	No	The RFI theme sensitivity is low for the entire extent of the project. The South African Radio Astronomy Observatory (SARAO) has been consulted regarding the development of the project since the commencement of the S&EIR Process. No specific negative impacts or issues have been raised to date by the SARAO regarding the project.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A terrestrial and aquatic ecological screening report has been undertaken and is included as Appendix E2. A full assessment will be undertaken during the EIA phase.
Geotechnical Assessment Sensitivity: Not indicated	Yes	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 considered to be of a technical concern rather than an environmental concern. A Desktop Geotechnical Assessment is included in Appendix E10.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E8.
Landscape / Visual Impact Assessment Sensitivity: Not indicated	Yes	A Visual Impact Assessment is included in Appendix E4 of the Scoping Report.

Table 1.5: Specialist studies identified by the DFFE Screening Tool, **substation category** and specialist studies completed

Study identified in the DFFE Screening Tool and sensitivity	**Study included?**	**Appendix**
Agricultural Impact Assessment Sensitivity: High	Yes	An Agricultural Compliance Statement is included in Appendix E5 of the Scoping Report.
Animal Species Assessment Sensitivity: High	No	A Terrestrial, Animal and Plant Report and an Avifaunal Assessment will be undertaken during the EIA phase of the project once the required site inspections are undertaken.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High	Yes	An Aquatic Ecological Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the

		Protocols of GNR320 – refer to the content of the report.
Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment is included in Appendix E6 of the Scoping Report, as per the requirements of the National Heritage Resources Act.
Civil Aviation Assessment Sensitivity: Low	No	The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. This is based on the current land use of the site being used for agricultural grazing purposes. The Civil Aviation Authority 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 CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Defence Theme Sensitivity: Low	No	The affected property is confirmed to be used for agricultural grazing purposes and therefore the development will not have any impact on defence installations. The sensitivity for the entire extent of the site is low and therefore no assessment has been included. The South African National Defence Force 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 regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Palaeontological Impact Assessment is included in Appendix E7 of the Scoping Report, as per the requirements of the National Heritage Resources Act.
Plant species Assessment Sensitivity: Medium	No	A terrestrial, Animal and Plant Report will be undertaken during the EIA phase of the project once the required site inspections are undertaken.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A terrestrial and aquatic ecological screening report has been undertaken and is included as Appendix E2. A full assessment will be undertaken during the EIA phase.
Geotechnical Assessment Sensitivity: Not indicated	Yes	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 considered to be of a technical concern rather than an environmental concern. A Desktop Geotechnical Assessment is included in Appendix E10.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E8.

Landscape / Visual Impact Assessment Sensitivity: Not indicated	Yes	A Visual Impact Assessment is included in Appendix E4 of the Scoping Report.

Table 1.6: Specialist studies identified by the DFFE Screening Tool, **powerline category** and specialist studies completed

Study identified in the DFFE Screening Tool and sensitivity	**Study included?**	**Appendix**
Agricultural Impact Assessment Sensitivity: High	Yes	An Agricultural Compliance Statement is included in Appendix E5 of the Scoping Report.
Animal Species Assessment Sensitivity: High	No	A Terrestrial, Animal and Plant Report and avifaunal assessment will be undertaken during the EIA phase of the project once the required site inspections are undertaken.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High	Yes	An Aquatic Ecological Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment is included in Appendix E6 of the Scoping Report, as per the requirements of the National Heritage Resources Act.
Civil Aviation Assessment Sensitivity: Low	No	The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. This is based on the current land use of

		the site being used for agricultural grazing purposes. The Civil Aviation Authority 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 CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Defence Theme Sensitivity: Low	No	The affected property is confirmed to be used for agricultural grazing purposes and therefore the development will not have any impact on defence installations. The sensitivity for the entire extent of the site is low and therefore no assessment has been included. The South African National Defence Force 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 regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Palaeontological Impact Assessment is included in Appendix E7 of the Scoping Report, as per the requirements of the National Heritage Resources Act.
Plant species Assessment	No	A Terrestrial, Animal and Plant Report will be undertaken during

Sensitivity: Medium		the EIA phase of the project once the required site inspections are undertaken.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A terrestrial and aquatic ecological screening report has been undertaken and is included as Appendix E2. A full assessment will be undertaken during the EIA phase.
Geotechnical Assessment Sensitivity: Not indicated	Yes	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 considered to be of a technical concern rather than an environmental concern. A Desktop Geotechnical Assessment is included in Appendix E10.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E8.
Landscape / Visual Impact Assessment Sensitivity: Not indicated	Yes	A Visual Impact Assessment is included in Appendix E4 of the Scoping Report.

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

1.6 STRUCTURE OF THE REPORT

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

Table 1.7: Structure of the report

Requirements for the contents of an EIR as specified in the Regulations		Section in report
Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a)	details of -	1
	(i) the EAP who prepared the report; and	
	ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-	
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered and being applied for; and	
	(ii) a description of the associated structures and infrastructure related to the development.	
(e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	3
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	A motivation for the preferred development footprint within the approved site.	5
(h)	a full description of the process followed to reach the proposed development footprint within the approved site, including –	
	(i) details of all the development footprint alternatives considered;	

	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and	
	(x) a concluding statement indicating the preferred alternative development location within the approved site.	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-	6
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(j)	an assessment of each identified potentially significant impact and risk, including-	
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	

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

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

2 ACTIVITY DESCRIPTION

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

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

(b) the location of the activity, including-

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

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

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

(c) a plan which locates the proposed activity 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 project entails the development of a photovoltaic solar facility and associated infrastructure on Reminder of Portion 10 of the Farm Rooidraai No. 85Registration Division IQ, North West Province situated within the JB Marks Local Municipality area of jurisdiction. The proposed development is located in the North West Province in the northern interior of South-Africa (refer to Figure B for the regional map). The town of Carletonville is located approximately 19 km south east of the proposed development (refer to Figure A for the locality map).

The total area assessed as part of this EIA Report (hereinafter referred to as the "development area") is 296 ha. The full extent of the development area was considered during scoping with the aim of confirming the suitability from an environmental and social perspective. Based on the outcome of the findings of the scoping phase, a development footprint has been defined. Refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Rooidraai Solar (Pty) Ltd from the property owner for the life span of the project (minimum of 20 years).

It is expected that generation from the facility will tie in with an existing grid infrastructure present within the affected property/ies. Two (02) alternatives were being considered during the scoping phase; these were as follows:

- *Alternative 1:* The auxiliary infrastructure and EGI are located in the north-eastern corner of the facility. A 132 kV powerline (~1 km long) from the Eskom switching station will connect to the Eskom Hardeklip 132 kV Traction Substation. The EGI is located within a 100 m wide assessment corridor.
- *Alternative 2:* The auxiliary infrastructure and the Electricity Grid Infrastructure (EGI) are located in the south-western corner of the facility. A 132kV Loop-In-Loop-Out (LILO) power line from the Eskom switching station will connect into the Hardeklip TR/ Mooirivier RR 1 132kV Feeder Conductor. The EGI is located within a 100 m wide assessment corridor.

Based on feedback received from Eskom subsequently, alternative 2, namely the LILO grid solution is preferred and considered to be technically feasible. Therefore, this is the only grid solution being considered at EIA phase.

Two access points are proposed as alternatives. The majority of the access roads will follow existing, gravel farm roads that may require widening of up to 10 m (inclusive of storm water infrastructure), although approximately 1.7km of the preferred route is new and will require clearing of vegetation since it does not follow an existing track. Where new sections of road need to be constructed (lengthened), this will be gravel/hard surfaced access roads and only tarred if necessary.

Table 2.1: General site information

Description of affected farm portion	<u>Solar PV Facility:</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 <u>100 m Grid Corridor:</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 <u>Access Road:</u> <u>Alternative 1 (preferred):</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 Alternative 2: • Remainder of Portion 3 of Farm Rysmierbult No. 88 • Remainder of Portion 2 of Farm Rysmierbult No. 88 • Remainder of Portion 14 of Farm Rysmierbult No. 88

	• Remainder of Portion 13 of Farm Rysmierbult No. 88 • Remainder of Portion 12 of Farm Rysmierbult No. 88 • Remainder of Portion 1 of Farm Rysmierbult No. 88 • Remainder of Portion 15 of Farm Rysmierbult No. 88 • Remainder of Portion 1 of Farm Rysmierbult No. 88
Province	North West
District Municipality	Dr Kenneth Kaunda District Municipality
Local Municipality	JB Marks Local Municipality
Ward numbers	28
Closest towns	The town of Carletonville is located approximately 19 km south east of the proposed development.
21 Digit Surveyor General codes	<u>Solar PV Facility:</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 T0IQ00000000008500010 <u>100 m Grid Corridor:</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 T0IQ00000000008500010
Title Deed	<u>Solar PV Facility:</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 o T72029/2009 <u>100 m Grid Corridor:</u> • Remainder of Portion 10 of Farm Rooidraai No. 85 o T72029/2009
Photographs of the site	Included in Plates as an appendix to the Report
Type of technology	Photovoltaic solar facility
Structure Height	• Panels ~6m, • Buildings ~ 9m,

	• Battery storage facility ~8m • Pylons ~32m
Battery storage	Within a 5 ha area within the development footprint
Surface area to be covered (development footprint)	Approximately 296 ha
Structure orientation	Monofacial or Bifacial PV panels will be utilised. The panels will either be fixed to a single-axis and/or double 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.
Laydown area dimensions (area assessed as part of the EIA)	Temporary laydown areas will occupy up to 5 ha while 8 ha will remain in place for the permanent laydown areas as required for facility operation.
Generation capacity	Up to 150 MW
Expected production	N/A - this will be dependent on the chosen technology.

The site is located outside urban areas and in a cattle farming agricultural region, as well as mining activities. The site survey revealed that the affected property currently consists of cattle grazing agricultural activities – refer to plates 1-9 for photographs of the affected property and proposed development footprint area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 11(ii)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as energy generated by the PV array will be transmitted via underground medium voltage cables (i.e., up to 33kV) to the onsite Rooidraai solar substation (the onsite facility substation) where it will be stepped-up to 132kV. Thereafter, the electricity

		will pass to an existing offsite Eskom facility substation via a 132kV overhead powerline.
GNR. 327 (as amended in 2017)	Activity 12(ii)(a)(c)	• "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."* • Activity 12(ii)(a)(c) is triggered as the project area comprises of existing roads which traverse watercourses. The existing access roads that traverse watercourses will be expanded to suit the project needs and to allow for heavy motor vehicles to access the construction site.
GNR. 327 (as amended in 2017)	Activity 19	• *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."* • Activity 19 is triggered as the project area comprises of existing roads which traverse watercourses. The existing access roads that traverse watercourses will be expanded to suit the project needs and will require removal of more than 10 cubic metres of soil.
GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.* • Activity 24(ii) is triggered as the proposed access road to the Rooidraai Solar PV facility will be up to 8 m wide, but with the inclusion of side drains and gavel embankments, will exceed the threshold of this activity.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as the total area to be developed for the PV facility and associated infrastructure is greater than 1 ha and occurs outside an urban area in an area currently zoned for agriculture. The property will be re-zoned to "special" use.

GNR. 327 (as amended in 2017)	Activity 56(ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered as existing roads will require widening of up to 6 m and/or lengthening by more than 1 km, to accommodate the movement of heavy vehicles and cable trenching activities.
GNR. 325 (as amended in 2017)	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar energy facility will generate up to 150 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar PV facility is approximately 296 ha in extent.
GNR. 324 (as amended in 2017)	Activity 4 (h)(iv)	• "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (h) North West province, (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."* • Activity 4 (h)(iv) is triggered as the site is located within a CBA 2 and ESA. The project requires internal and perimeter roads wider than 4 m.
GNR. 324 (as amended in 2017)	Activity 10 (h)(iv)	• *"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 (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."* • Activity 10(h)(iv) 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 exceeding 30 but not

		exceeding 80 cubic metres. The site is located within a CBA 2 and ESA.
GNR. 324 (as amended in 2017)	Activity 12 (h)(iv)(vi)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."* • Activity 12 (h)(iv)(vi) is triggered since the proposed development is located in the North West province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. The site is located within a CBA 2 and ESA. The project requires the expansion of existing access roads located 100 m from the watercourse west of the proposed facility.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(h)(iv)	• "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."* • Activity 14(ii)(a)(c)(h)(iv) is triggered as the project is located within the North West Province. The project requires the development of internal and perimeter access roads. The perimeter access roads require expansion and lies within 32 m of the watercourse while at some points the road will traverse watercourses. The site is located within a CBA 2 and ESA.
GNR. 324 (as amended in 2017)	Activity 18 (h)(v)(ix)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) North West (v) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (ix) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."* • Activity 18 (h)(v)(ix) is triggered since the existing access roads to the site will need to be widened by more than 4 metres. The access roads are located within 32 m from the watercourse and traverses the watercourse at

		certain points. Furthermore, the site is located within a CBA 2 and ESA.

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 inside roads/paths – The majority of the access road will follow existing, gravel farm roads that may require widening up to 10 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 of up to 33 km, each with a width of up to 6 m, will be constructed to provide access to the various components of the PV development.
- Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layers where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

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

The key components of the proposed project are described below:

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

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

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480 V up to 33 kV up to 132 kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480 V and this is fed into step up transformers to 132 kV. An onsite substation will be required to step the voltage up to 132 kV, after which the power will be evacuated into the national grid. It is expected that generation from the facility will tie in with existing grid infrastructure present within the affected property/ies. Two (02) alternatives were being considered during the scoping phase; these were as follows:

    - *Alternative 1:* The auxiliary infrastructure and EGI are located in the north-eastern corner of the facility. A 132 kV powerline (~1 km long) from the Eskom switching station will connect to the Eskom Hardeklip 132 kV Traction Substation. The EGI is located within a 100 m wide assessment corridor.

    - *Alternative 2:* The auxiliary infrastructure and the Electricity Grid Infrastructure (EGI) are located in the south-western corner of the facility. A 132kV Loop-In-Loop-Out (LILO) power line from the Eskom switching station will connect into the Hardeklip TR/ Mooirivier RR 1 132kV Feeder Conductor. The EGI is located within a 100 m wide assessment corridor.

  Based on feedback received from Eskom subsequently, alternative 2, namely the LILO grid solution is preferred and considered to be technically feasible. Therefore, this is the only grid solution being considered at EIA phase.

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

- Supporting Infrastructure – The following auxiliary buildings including a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre will be required as well as a 33kV switch room. The project requires the need for both temporary and permanent laydown areas.

- Battery Energy Storage System – A Battery Storage Facility with a maximum height of 8m and development footprint of ~5 ha and associated operational, safety and control infrastructure.

- Roads – The majority of the access road will follow existing, gravel farm roads that may require widening up to 10 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 (up to 33 km), each with a width of up to ± 6 m, will be constructed to provide access to the various components of the PV development. Two access points are proposed as alternatives. The majority of the access roads will follow existing, gravel farm roads that

may require widening of up to 10 m (inclusive of storm water infrastructure), although approximately 1.7km of the preferred route is new and will require clearing of vegetation since it does not follow an existing track. Where new sections of road need to be constructed (/lengthened), this will be gravel/hard surfaced access roads and only tarred if necessary.

- 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 3.5 meters will be used.

Figure 2.1: Typical example of solar PV array

2.4 LAYOUT DESCRIPTION

The draft layout plan provided within in this scoping report considers technical constraints from a 'developer viewpoint'. The environmental limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site will be further investigated during the detailed EIA phase – refer to Figure I. 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). The site comprises of environmental sensitivities which will be considered when preparing the development layout of the solar facility which will be further assessed during the EIA phase (refer to Figure I). Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	Up to 5.5 m
Area of PV Array	The total area assessed for the PV array and the associated supporting infrastructure is ~296 ha. A development footprint will be defined during the EIA phase but is not anticipated to exceed 296 ha.
Area occupied by inverter / transformer stations / substations / BESS	BESS: up to ~5 ha Facility substation: up to 1.125 ha
Capacity of on-site substation	132kV
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: Up to 8 ha Construction Laydown Area: ~5 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: ~ 1 ha
Battery storage facility	The Battery Storage Facility will occupy an area of up to 5 hectares. Maximum height of the BESS is 8 m.
Length of internal roads	Approximately 33 km
Width of internal roads	Approximately 6 meters *N.B: Only the main access roads may be widened up to 10 meters*
Height of fencing	~3.5 m
Height of powerline	Up to 32 m
Capacity of the power line	132 kV
Eskom Switching Station	132 kV
Electricity Grid Infrastructure Corridor	The total area assessed for the Electricity Grid Infrastructure is 1km long and 100m wide corridor.
Grid connection corridor width	Up to 100 m assessment corridor
Grid connection corridor length	Up to 1 km assessment corridor

Power line servitude width	Up to 36 m
Type of pylon to be used	Lattice or monopole

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

Table 2.4: Project co-ordinates

Coordinates			
Project Site Boundary	A	26°21'23.68"S	27° 9'35.79"E
	B	26°21'42.80"S	27°11'0.93"E
	C	26°22'7.58"S	27°11'5.98"E
	D	26°22'25.63"S	27° 9'50.70"E
100 m Grid Corridor			
Start	A	26°22'15.40"S	27° 9'48.58"E
Mid-Point	B	26°22'20.21"S	27° 9'31.64"E
End 1	C	26°22'22.92"S	27° 9'24.47"E
End 2	D	26°22'25.15"S	27° 9'33.25"E
Auxiliary Infrastructure			
Located at south west corner	1	26°22'10.26"S	27° 9'47.53"E
	2	26°22'10.52"S	27° 9'59.01"E
	3	26°22'23.13"S	27° 9'58.99"E
	4	26°22'25.12"S	27° 9'51.01"E
Proposed Access Road (as per TIA)			
Start	A	26°22'9.15"S	27° 9'47.19"E
Bend Point 1	B	26°22'14.11"S	27° 8'50.84"E
Bend Point 2	C	26°22'12.91"S	27° 8'46.16"E
Bend Point 3	D	26°21'39.96"S	27° 8'23.16"E
End	E	26°21'12.31"S	27° 7'50.46"E

The figures below indicate the co-ordinate points as per Table 2.4. above.

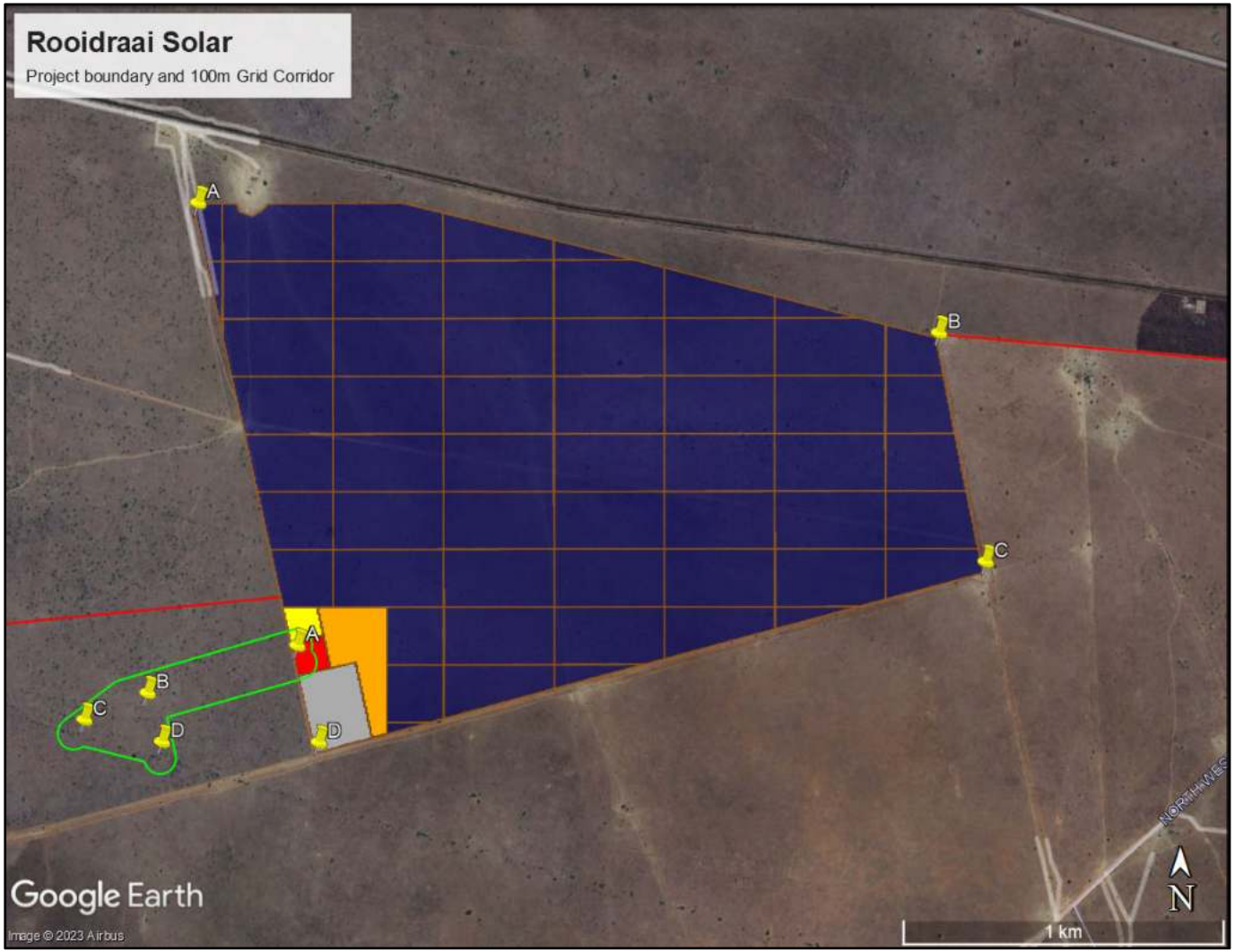


Figure 2.2: Approximate co-ordinate points of the project boundary and grid alternatives

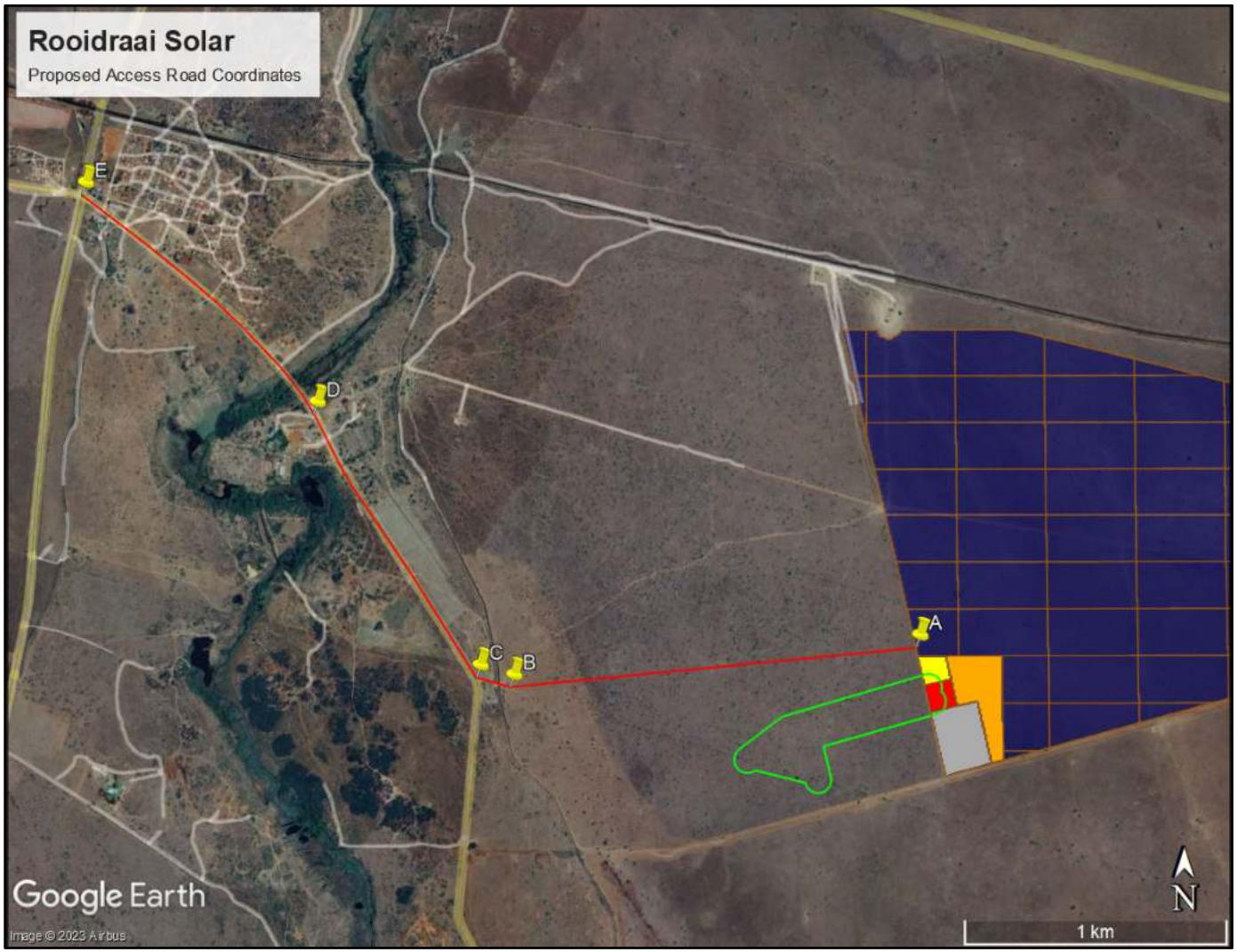


Figure 2.3: Approximate co-ordinate points of the access road

2.5 SERVICES PROVISION

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

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Four options will be considered, in order of priority by the Developer:

1. Supply 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. Supply from a Private Contractor, which may include extraction from any bulk water supply lines nearby to the site.
3. An existing borehole on site, subject to NWA requirements.
4. A new borehole on site, subject to NWA requirements.

The estimated maximum amount of water required during construction is 34 100kl. The estimated maximum amount of water required during the operational phase is 9 547 kl per annum.

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. It will also be good practice to design stormwater canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Stormwater management and mitigation measures are included in the Environmental Management 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. Should the contractor decide to install a conservancy tanks/s, this will be done in accordance with the NWA.

No effluent will be produced during operation of the facility, except for normal sewage from site and operations staff. This will be collected and treated as per normal standards using a septic or conservancy tank. In cases where the Local Municipality does not permit the use of sceptic tanks, sewage will be stored in conservancy tank and collected by means of a honey-sucker and treated at an approved facility off site.

2.5.4 Solid Waste

During the construction phase, solid waste will mainly be in the form of construction material, 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. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility. During the EIA, the applicant will request confirmation from the municipality that they have sufficient capacity at their registered landfills for the solid waste.

During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality.

2.5.5 Electricity

Electricity supply during construction will be provided by either diesel generators or arranged with the Local Municipality or Eskom Distribution, via an 11kV or 22kV feeder line. During operation, the electricity will be supplied by the facility.

2.6 DECOMMISSIONING OF THE FACILITY

The operating period will be 20-25 years from the commencement date of the operation phase. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

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

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

- The PV facility would be disconnected from the Eskom grid.
- The BESS, inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed, and the structures would be dismantled.
- Wastewater storage conservancy tank would be responsibly removed, and area would be rehabilitated.
- The underground cables would be unearthed and removed, and buildings would be demolished and removed.
- The fencing would be dismantled and removed.

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

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

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; 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 3. (3) An EIR (...) must include-

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

3.1 INTRODUCTION

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

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

- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- North West Provincial Spatial Development Framework (PSDF) (2016)
- Dr Kenneth Kaunda DM Amended Integrated Development Plan (IDP) 2017 – 2022 (2020)
- JB Marks Local Municipality Integrated Development Plan 2019/2020 (2020)
- JB Marks Local Municipality Spatial Development Framework (2017)

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

3.2 LEGISLATIVE CONTEXT

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

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

	Department: Economic Development, Environment, Conservation and Tourism		The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. The EIA process undertaken for the Rooidraai Solar PV facility is in-line with the requirements of NEMA for the Application for Environmental Authorisation.
The National Energy Act **(Act No. 34 of 2008)**	Department of Mineral Resources and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble). Considering that the Rooidraai Solar PV facility is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.
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. Also, should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license.

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

(Act No. 25 of 1999)			ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS for the Rooidraai Solar PV facility with case reference number 20163, 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 E6, and the Palaeontological Impact Assessment 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, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long-term lease agreement. An Agricultural Compliance statement has been undertaken for the Rooidraai Solar PV facility and is included as Appendix E5.
The National Forests Act, 1998	Department of Environmental Affairs (now known as the Department of	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;

(Act 84 of 1998)	Forestry, Fisheries and the Environment)	(c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. A Terrestrial and aquatic ecological screening report has been undertaken for the Rooidraai Solar PV facility scoping phase and is included in Appendix E2.

3.3 POLICY CONTEXT

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

			Considering that the construction of and investment in renewable energy is a key area identified within the framework, the Rooidraai Solar PV facility is considered to be in-line with the framework.
Climate Change Bill	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2018	On 08 June 2018 the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill: • Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; • Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response; • Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner. The Rooidraai Solar PV facility 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 Rooidraai Solar PV facility 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 Rooidraai Solar PV facility 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 Rooidraai Solar PV facility could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs

Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2014	The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA were accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is 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 Rooidraai Solar PV facility is not located within a REDZ, but the development will contribute to the expansion of renewable energy facilities and infrastructure within the country, and provide the positive opportunities associated with it.
North West Provincial Spatial Development Framework	North West Province	2016	The North West PSDF is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the North West Provincial Growth and Development Strategy which has committed the North West 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:

- Adopt a holistic approach to spatial development in order to minimise the long-term negative impacts of current land use or development decisions.
- Ensure that spatial planning serves national, provincial and/or local interest.
- Support the long-term adequacy or availability of physical, social and economic resources to support or carry development.
- Protect existing natural, environmental, and cultural resources.
- Ensure that land which is currently in agricultural use would only be reallocated to other uses where real need exists, and prime agricultural land should remain in production.
- Support mining as a vital economic driver in the province without jeopardizing the biodiversity value of the environment.
- Adopt a climate change strategy that will provide for responsible actions to curb the effect of global warming and climate change.

The Spatial Challenges and Opportunities provide the crucial components that underlie sustainable development, i.e., need for basic infrastructure and development for the poor, economic growth and development, environmental conservation, and improved livelihoods. These spatial development priorities form the basis for guiding specific decisions regarding the desired spatial development and arrangement of broad land uses within North West and investment and development spending.

The PSDF provides a Spatial Framework and Development Strategies that will manage future growth and associated change in a way that protects and enhance the use of natural resources, biodiversity, and lifestyle values. This requires a highly sustainable pattern of development based on the efficient utilisation of land and infrastructure, supported by management decisions over ad hoc and dispersed forms of development.

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 North West, and builds upon international best-practice and technology

The development of the Rooidraai Solar PV facility will contribute to the goals of the area, albeit to a limited extent.

Dr Kenneth Kaunda DM Amended Integrated Development Plan (IDP)	Dr Kenneth Kaunda District Municipality	2017-2022	The long-term vision of the Dr Kenneth Kaunda DM is: *"Exploring prosperity through sustainable service delivery for all".* The above stated vision defines what the Dr Kenneth Kaunda District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is that: *"To provide an integrated district management framework in support of quality service delivery".* The Key Performance Areas Identified for the municipality is: o Basic Service Delivery and Infrastructure Development o Municipal Institutional Development Transformation o District Economic Development o Financial viability and management o Good Governance and Public Participation o Spatial Rationale The development of the Rooidraai Solar PV facility will contribute to the goals of the area, albeit to a limited extent.
JB Marks Local Municipality Integrated Development Plan (IDP)	LB Marks Local Municipality	2019/ 2020	The vision of the JB Marks LM is "*A transformed, leading, competitive and preferred world class city."* The Mission Statement is to *"Provide quality sustainable services that are responsive to our communities' needs within a healthy, safe and green environment through good governance."* The vision and mission of the municipality have led to the mayoral developmental priorities of the LM An assessment of the internal and external environment and the feedback from the communities it indicates that for the municipality to improve the lives of our people, the following issues should be prioritised: o Land and Housing o Job creation o Agriculture, Rural and economic development o Water and sanitation

		○ Safe community ○ Vulnerable groups empowerment ○ Energy (electricity) ○ Storm water drainage ○ Sports and recreation ○ Health and welfare ○ Environment ○ Quality sustainable service delivery The development of the Rooidraai Solar PV facility will contribute to the goals of the area, albeit to a limited extent.
JB Marks Local Municipality Spatial Development Framework (SDF)	JB Marks Local Municipality 2017	Spatial Development Framework can be described as an indicative plan showing the desired patterns of land use, direction of growth, special development areas and conservation-worthy areas. The SDF needs to be informed by the vision of the municipal area, the development objectives, as well as the strategies and outputs identified by the IDP. The Spatial Planning and Land Use Management Act, 2013 (SPLUM 2013) stipulates the role of a local municipality relating to spatial planning and land use management on the following elements: ○ The compilation, approval, and review of integrated development plans. ○ The compilation, approval, and review of the components of an integrated development plan prescribed by legislation and falling within the competence of a municipality, including a spatial development framework and a land use scheme; and ○ The control and regulation of the use of land within the municipal area where the nature, scale and intensity of the land use does not affect the provincial planning mandate of provincial government or the national interest.

The Spatial Vision of the municipality is: "*To reconstruct the urban and rural framework of JB Marks Local Municipality in order to create an integrated and sustainable city by capitalizing on its strategic location and the inherent economic potential that the area has to offer*."

The development of the Rooidraai Solar PV facility will contribute to the goals of the area, albeit to a limited extent.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

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

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)[1]
- 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
- 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.

[1] 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.

3.6 CONCLUSION

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

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed Rooidraai Solar PV facility 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 3.** (3) An EIR (...) must include-
>
> (f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

4.1 THE NEED FOR THE PROPOSED ACTIVITY

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

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel 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 as per Table 4.1 below:

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

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

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

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW and 860MW 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 North West Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment. The location of the proposed development within the JB Marks Local Municipality is desirable as a large portion of households live within the poverty level (77.8%) which has an annual income of less than R38 200 (JB Marks LM IDP, 2022-2027).
- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.
- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in non-renewable electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa

where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.

- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the 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 240 employment opportunities will be created during the construction phase and approximately 25 employment opportunities during the operational phase.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Because of predominantly the climate and soil limitations, the site is totally unsuitable for cultivated crops, and the viable agricultural land use is limited to grazing only. The proposed development in this specific area will generate alternative land use income through rental for the proposed energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: The national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.
- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

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

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

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

(i) details of all the development footprint alternatives considered;

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

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

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

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

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

5.1 CONSIDERATION OF ALTERNATIVES

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

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

5.1.1 No-go Alternative

This alternative considers the option of 'do nothing' and maintaining the status quo of the affected environment. The description provided in section 5.3 of this report could be considered the baseline conditions (*status quo*) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for the current land uses present. The area associated with the development footprint has

limited agricultural potential and is unsuitable for cultivation, with grazing considered to be the only agricultural option. The potential opportunity costs in terms of alternative land use income through rental for the energy facility and the supporting social and economic development in the area would be lost if the *status quo* persists.

5.1.2 Location Alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Rooidraai Solar (Pty) Ltd in the Carletonville area to potentially establish the Rooidraai Solar PV facility. From a local perspective the Reminder of Portion 10 of the Farm Rooidraai No. 85 is preferred due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., low agricultural potential and archaeology), proximity to a grid connection point (i.e., for the purpose of electricity evacuation), as well as site access (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

Based on the above site-specific attributes, the study area is considered to be highly preferred in terms of the development of a solar PV facility. As such, no property / location alternatives will be considered. Refer to Figure 5.1 for the location of the single preferred property alternative.

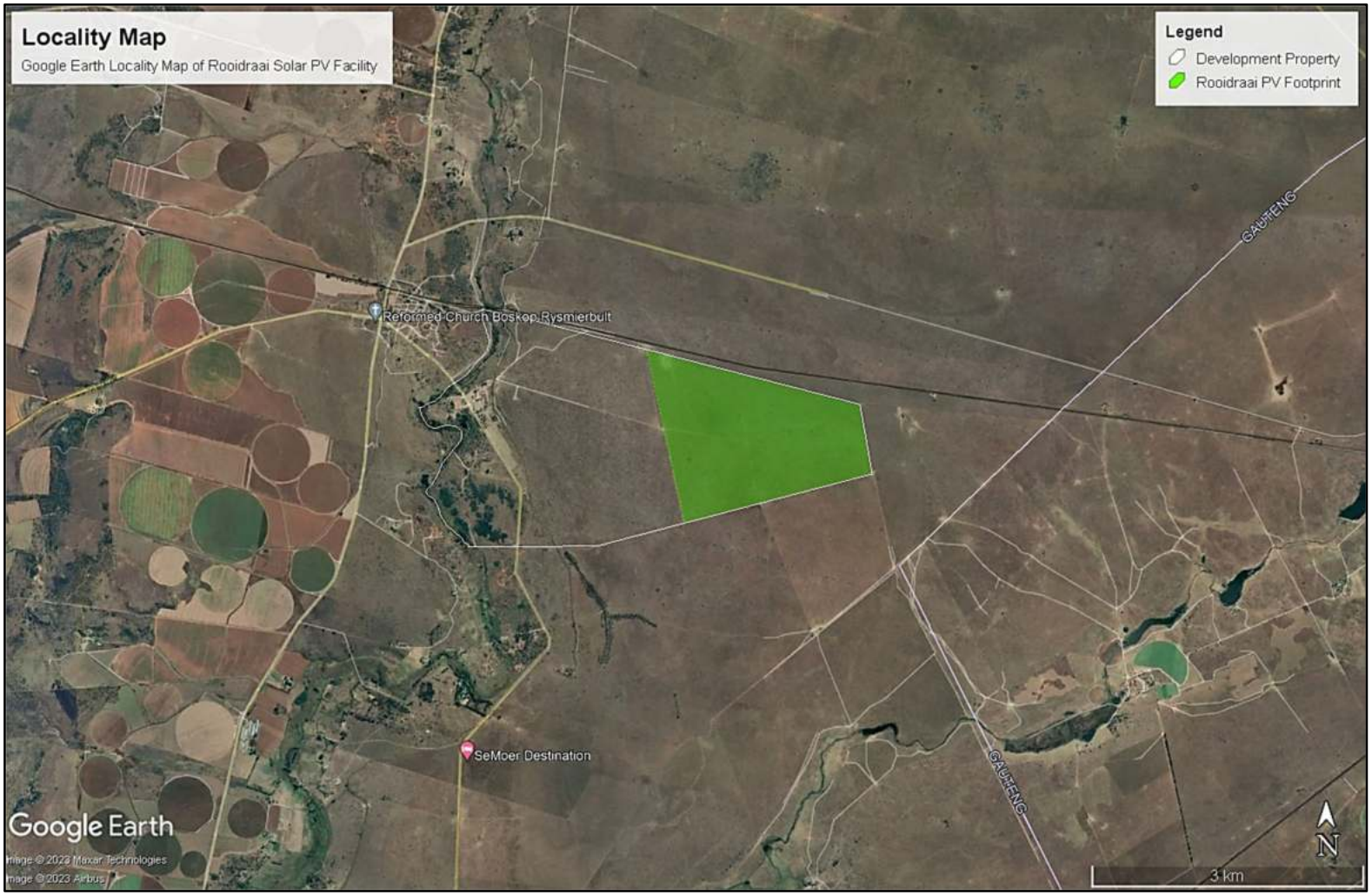


Figure 5.1: Location of the single preferred property alternative

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 – Rooidraai Solar (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, 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.

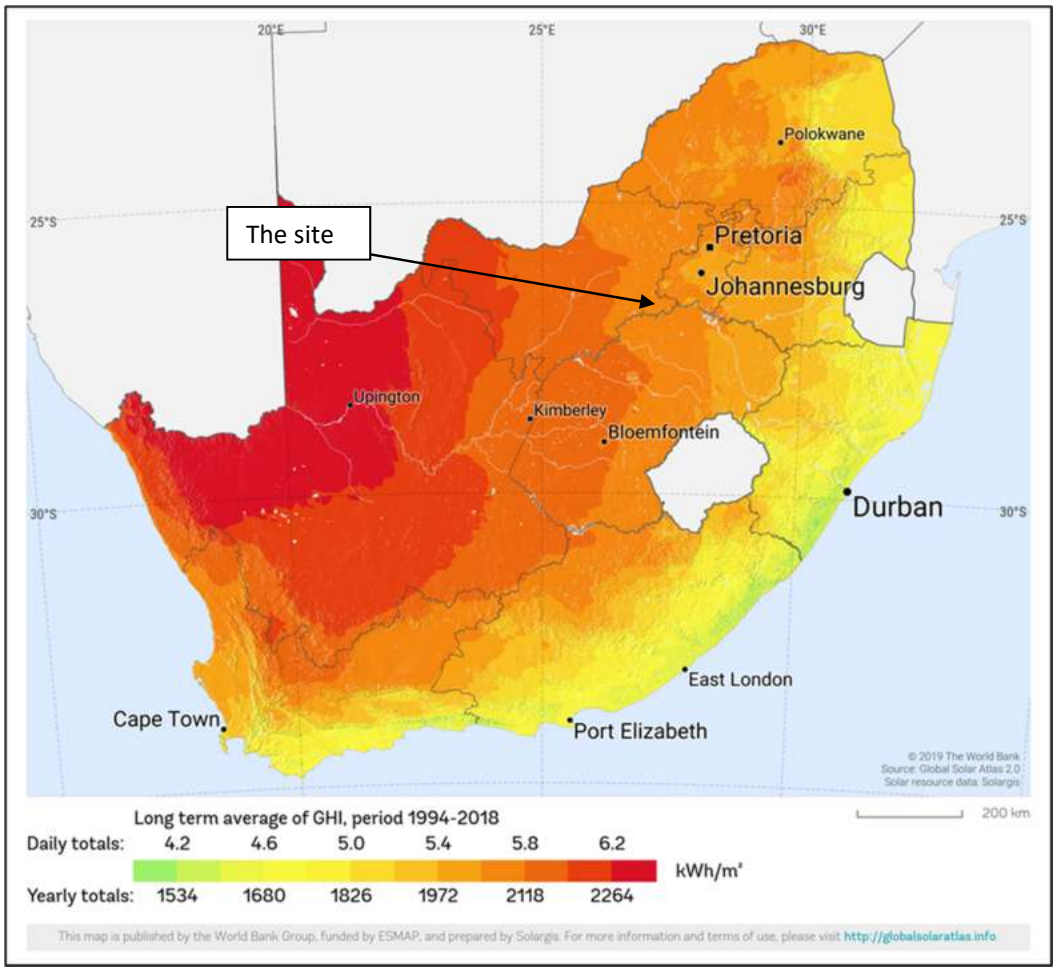


Figure 5.2: Global horizontal irradiation values for South Africa (Solar GIS, 2021) and the Rooidraai Solar PV facility development footprint

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 sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. A final layout plan is included as Figure 5.3.

The layout follows 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 EIA phase. The developer has considered the environmental sensitivities as identified during the scoping phase and have accordingly optimised the layout of the PV facility to ensure avoidance of the sensitive areas (Figure H1 to H6). This optimised layout is considered to be the final layout plan as assessed within this draft EIR.

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.

An initial site verification assessment (refer to Appendix D) was conducted using the DFFE National web-based screening tool as well as undertaking various specialised assessments on Reminder of Portion 10 of the Farm Rooidraai No. 85 and the farms were found favorable due to its close proximity to grid connections, solar radiation, ecology and relatively flat terrain. Where specific features of environmental sensitivity were identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers were considered by the developer to ensure that the facility layout is appropriate considering the sensitive features present. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site within the affected property.

Access roads will be required during both the construction and operational phases of the development. Various access points are being considered by the Developer and are highlighted in the Traffic Impact Assessment Report attached as Appendix E.

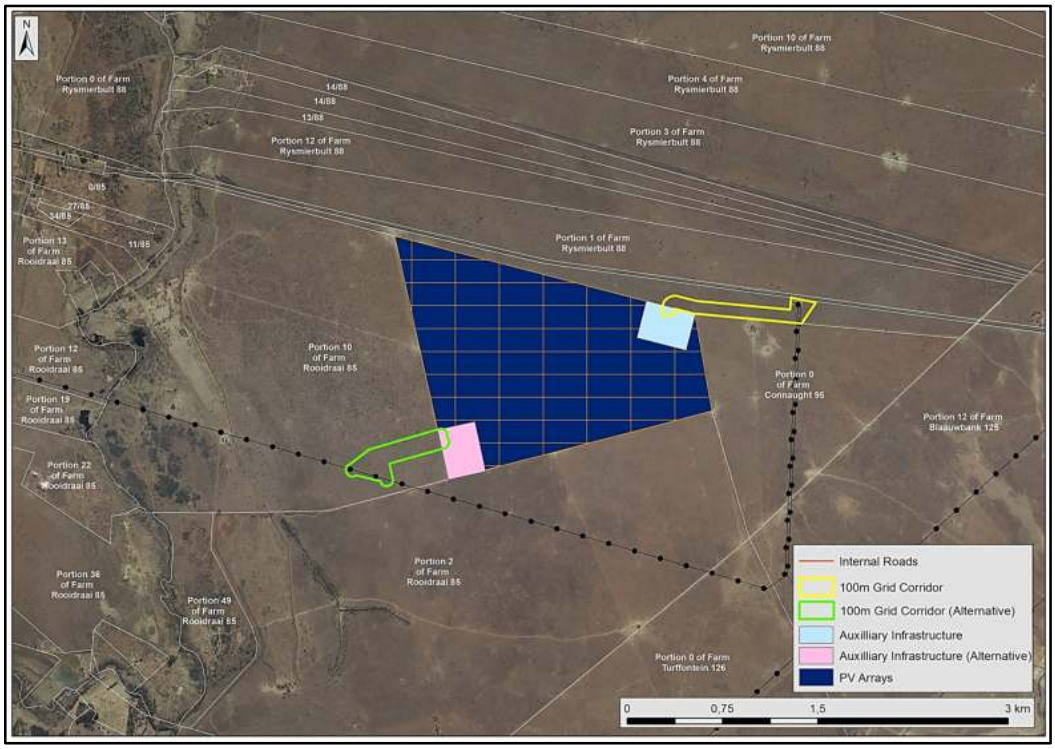


Figure 5.3: Scoping layout plan illustrating the alternatives that were considered for the Rooidraai solar PV facility and grid alternatives

Two access points are proposed as alternatives, the preferred route is labelled as “Access Road 1” (Figure 2) from a technical and land use perspective and an alternative route labelled as “Access Road 2”. The majority of the access roads will follow existing, gravel farm roads that may require widening of up to 10 m (inclusive of storm water infrastructure), although

approximately 1.7km of the preferred route is new and will require clearing of vegetation since it does not follow an existing track. Where new sections of road need to be constructed (lengthened), this will be gravel/hard surfaced access roads and only tarred if necessary.

Both access road alternatives have been assessed by the specialists and both alternatives were deemed acceptable. Because access road 1 is technically preferred, it is recommended as the preferred alternative.

Note: It is customary to develop the final/detailed construction layout of the solar PV facility only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or an alternative programme, after which major contracts are negotiated and final equipment suppliers identified.

5.1.5 Technology Alternatives

Powerline:

Two (02) grid connection alternatives were considered; these are as follows:

- *Alternative 1:* The auxiliary infrastructure and EGI are located in the north-eastern corner of the facility. A 132 kV powerline (~1 km long) from the Eskom switching station will connect to the Eskom Hardeklip 132 kV Traction Substation. The EGI is located within a 100 m wide assessment corridor.
- *Alternative 2:* The auxiliary infrastructure and the Electricity Grid Infrastructure (EGI) are located in the south-western corner of the facility. A 132kV Loop-In-Loop-Out (LILO) power line from the Eskom switching station will connect into the Hardeklip TR/ Mooirivier RR 1 132kV Feeder Conductor. The EGI is located within a 100 m wide assessment corridor.

Based on feedback received from Eskom, alternative 2, namely the LILO grid solution is preferred. Therefore, the only grid solution considered in this EIA report is Alternative 2. Alternative 1 has not been assessed further.

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

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

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

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

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

The following alternatives may be considered for the overhead powerline:

- Single Circuit Overhead Powerline - The use of single circuit overhead power lines to distribute electricity is considered the most appropriate technology and has been designed over many years for the existing environmental conditions and terrain as specified in the Eskom Specifications and best international practice. Based on all current technologies available, single circuit overhead power lines are considered the most environmentally practicable technology available for the distribution of power. This option is considered appropriate for the following reasons:
    - More cost-effective installation costs;
    - Less environmental damage during installation; and
    - More effective and cheaper maintenance costs over the lifetime of the power line.
- Double Circuit Overhead Power Line - Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the same tower structure) to minimise impacts. However, the use of double-circuiting has a number of technical disadvantages, which includes faults or problems on one powerline may mean that the other powerline is also disabled during maintenance, and this will affect the quality of supply to an area. Larger and taller towers as well as more towers are required for double-circuit power lines.

  The double-circuit overhead powerline proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be offline as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.
- Underground Distribution Lines - Underground cables have generally been used where it is impossible to use overhead lines (for example due to space constraints). Underground cables are oil cooled and are also at risk of groundwater contamination. Maintenance is also difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines.

Powerline Pylon Structure:

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

- Steel lattice towers - A lattice tower or truss tower is a freestanding vertical framework tower. This construction is widely used in transmission towers carrying high voltage electric power lines, in radio masts and towers (a self-radiating tower or as a support for aerials) and in observation towers. Its advantage is good shear strength at a much lower weight than a tower of solid construction would have as well as lower wind resistance.

- Steel monopoles - Monopole Tower is a kind of tower that consists of one stem or one pole anchored to the ground. Monopoles are polygonal sectioned and hot dip galvanized hollow steel structures used in various application in telecommunication, power transmission, railway, and other sectors. Monopoles are the latest advancement in transmission and distribution (T&D) sector, saving space and time for the grid manger and discoms. Monopole advantages are required small tower footprint and foundation, fast and easy to erect, available in different types depending upon applications.

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

Battery Energy Storage Facility (BESS)

As technological advances within Battery Energy Storage Systems (BESS) are frequent, two BESS technology alternatives are considered:

- Solid state battery electrolytes; and
- Redox-flow technology.

Solid state battery electrolytes, such as lithium-ion (Li-ion), zinc hybrid cathode, sodium ion, flow (e.g., zinc iron or zinc bromine), sodium sulphur (NaS), zinc air and lead acid batteries, can be used for grid applications. Compared to other battery options, Li-ion batteries are highly efficient, have a high energy density and are lightweight. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019).

Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy. Considering the nature of the project, only a solid-state technology type would be envisaged for implementation.

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

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

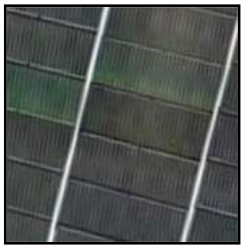
  - Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than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

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

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

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

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



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

- Bifacial panels:

  As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel. Refer to Figure 5.4.

  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.

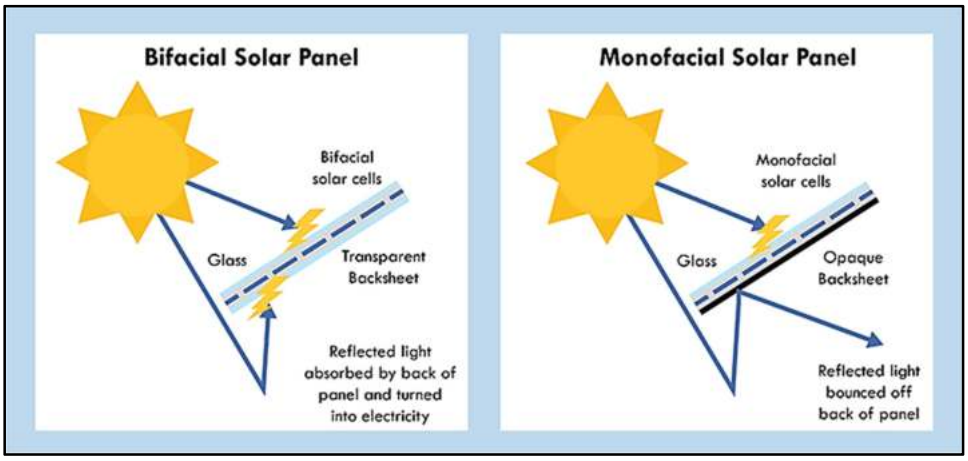


Figure 5.4: Bifacial vs monoficial solar panel absorption

5.2 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 Rooidraai Solar PV facility on the Reminder of Portion 10 of the Farm Rooidraai No. 85 is the preferred option.

No other possible sites were identified for the proposed Rooidraai Solar PV facility. This site is referred to as the preferred site. Additional land (if any) will be acquired to generate additional capacity in the future. The Eskom Hardeklip 132 kV Traction Substation is located approximately 1 km from the preferred site. Connection to the grid plays a vital role in the site location for renewable energy facilities as there is a shortage of grid connection space. The location of the preferred site shortens the length of the required grid connection in order to evacuate energy into the national grid, if chosen to connect directly. Alternatively, the existing Eskom owned OHPL's within the area allows for a Loop-in-Loop-out connection. There are sensitive features that occur on the site. However, the site is still viable. The size of the site made provision for the exclusion of any sensitive environmental features that arose through the EIA process and ensured that potential impacts are adequately mitigated.

Considering the environmental sensitive features present within the development footprint, the Applicant has proposed a development facility layout which considers these features, and thereby aim to avoid any direct impact on these features. The final layout is included as part of this Draft EIR (refer to Figure C and I). It may be concluded that this is the only location that will be assessed in further detail within sections 6 and 7.

5.3 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the Public Participation Process conducted in terms of Regulations 39 to 44.

5.3.1 General

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

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

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

- Site notices

  Site notices (size 60 cm x 42 cm) were erected on site on 14 October 2022 informing the public of the commencement of the S&EIR process. Photographic evidence of the site notices is included in Appendix C3.

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in the Carletonville Herald on 10 November 2022 (see Appendix C2) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement.

- Background Information Document (BID)

  A BID was released to all I&APs including the adjacent landowners, key stakeholders and relevant organs of state on 14 November 2022. The BID provided information on the proposed development, the S&EIA process. I&APs were invited to register onto the project I&AP database.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, have been directly informed of the S&EIR process via registered post, telephone calls, WhatsApp's and emails (as relevant). The BID was distributed with the notification on 14 November 2022. For a complete list of I&APs with their contact details see Appendix C4 of this report. It was expected from I&APs to provide their inputs and comments by 14 December 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7).

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via registered post, WhatsApp or email (as relevant) to all surrounding landowners and occupiers on 14 November 2022. Refer to Figure 5.5 for the location of the surrounding landowners. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C4. The surrounding landowners were given the opportunity to raise comments by 14 December 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7).

- Circulation of Draft Scoping Report

  Copies of the draft Scoping report has been 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 from 31 March to 04 May 2023. All issues identified during the 30-day review and comment period were recorded and documented and compiled into a Comments and Response Report included as part of the Final Scoping Report for decision-making (Appendix C5 – C7).

- Circulation of the Draft Environmental Impact Assessment Report

  All registered I&APs and State Department have been informed of the availability of the Draft EIR on 23 June 2023 and requested to provide their comments within 30 days (refer to Appendix C). The 30-day review and comment period is from 19 June 2023 up to and including 24 July 2023. All comments received during this period will be included in the final EIR. All comments received prior to the release of the Draft EIR have been included in Appendix C. The Comments and Responses report are included as Appendix C7 of this draft EIR.

- Circulation of decision and submission of appeals

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

5.3.2 Consultation Process

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

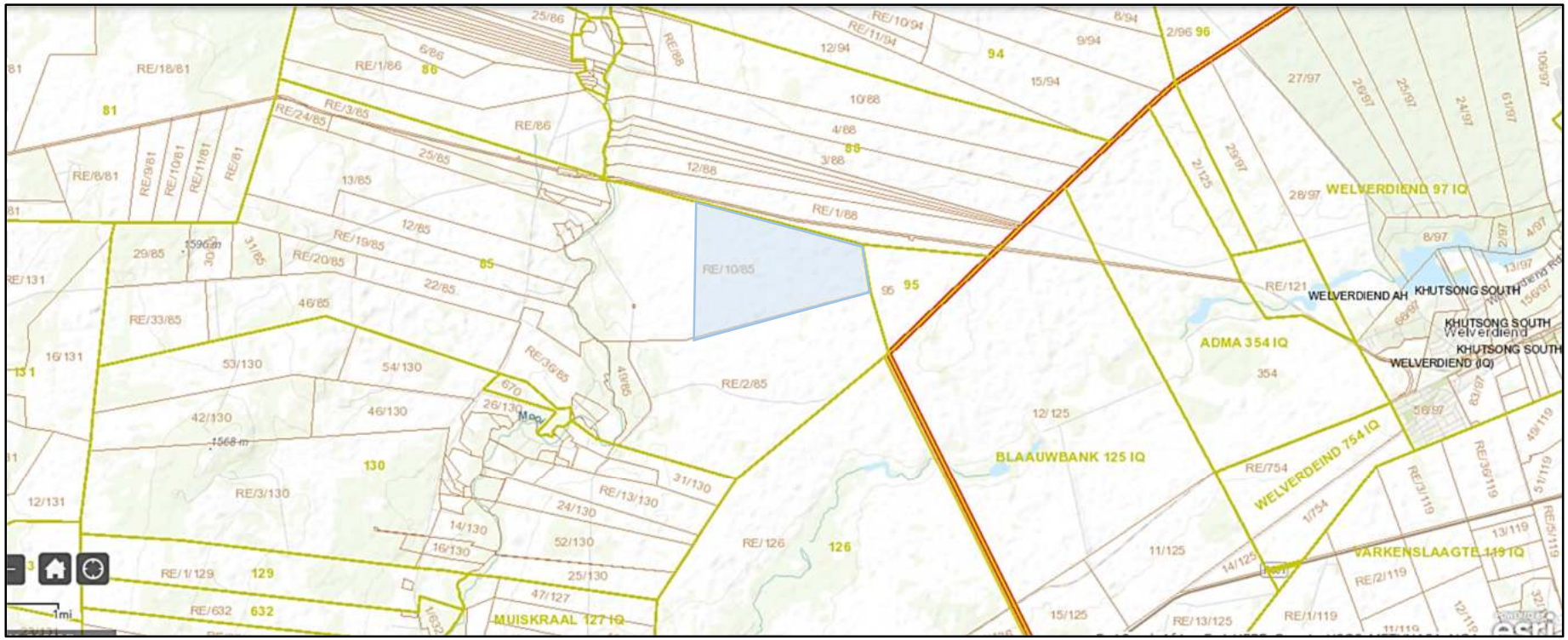


Figure 5.5: Affected properties (Blue) in relation to surrounding properties

5.3.3 Registered I&APs

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

This report is the Draft Environmental Impact Report which has been made available to all potential and/or registered I&APs and State Departments. They were provided with a copy of the Draft EIR and were requested to provide written comments on the report within 30 days. All issues identified during the review period, and previous review periods (i.e., Scoping Phase) will be documented and compiled into a Comments and Response Report and included as part of the Final EIR (Appendix C7).

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

5.3.4 Issues Raised by I&APs and Consultation Bodies

Several comments were received from I&APs and stakeholders including DFFE, the South African Heritage Resources Agency, Eskom, and individual surrounding landowners and affected parties. All comments received during the circulation of the Draft EIR will be addressed accordingly in the Final EIR. The full wording and original correspondence are included in Appendix C5 and Appendix C6 of the Draft EIR.

5.4 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).

5.4.1 Biophysical Environment

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

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

5.4.1.1 Climate

The site has a summer rainfall with a mean annual rainfall of approximately 608 mm and a mean annual evaporation of approximately 1403 mm (Schulze, 2009). The site is situated on flat terrain at an altitude of around 1,460 metres and average slopes of approximately 2%. The geology is shale, slate and quartzite of the Pretoria Group with interlayered diabase sills and Hekpoort lava., Chert, dolomite, Black Reef quartzite, grit and shale occurs in places. The site is dominated by loamy soils limited in depth by underlying bedrock. Dominant soil forms are Hutton, Mispah and Glenrosa. Rock outcrops are common. Due to their limited depth, such soils have insufficient moisture capacity to reliably carry a crop through the season. Some deeper soils are likely to occur in places but will be of insufficient size and separated by shallow soils and rock outcrops so that they are not viable for crop production.

5.4.1.2 Geology

According to the Desktop Geotechnical study (Appendix E10), the general geology of the area comprises late Archean to early Proterozoic metasediments of the basal Malmani Subgroup Dolomites and limestone which form parts of the Chuniespoort Group; Transvaal Supergroup. The Transvaal metasediments have been intruded by igneous diabase rocks which do not appear to underly the Rooidraai Solar site, but a dyke is noted to the south of the site, refer to Figure 5.6. The Malmani Subgroup is divided into five formations based on the relative composition of cherts, stromatolites, limestones and shales. The specific Malmani Subgroup formations overlying the site is not defined on the geological map. Much younger quaternary aged surficial transported and residual soils are likely to occur overlying these rocks as described below.

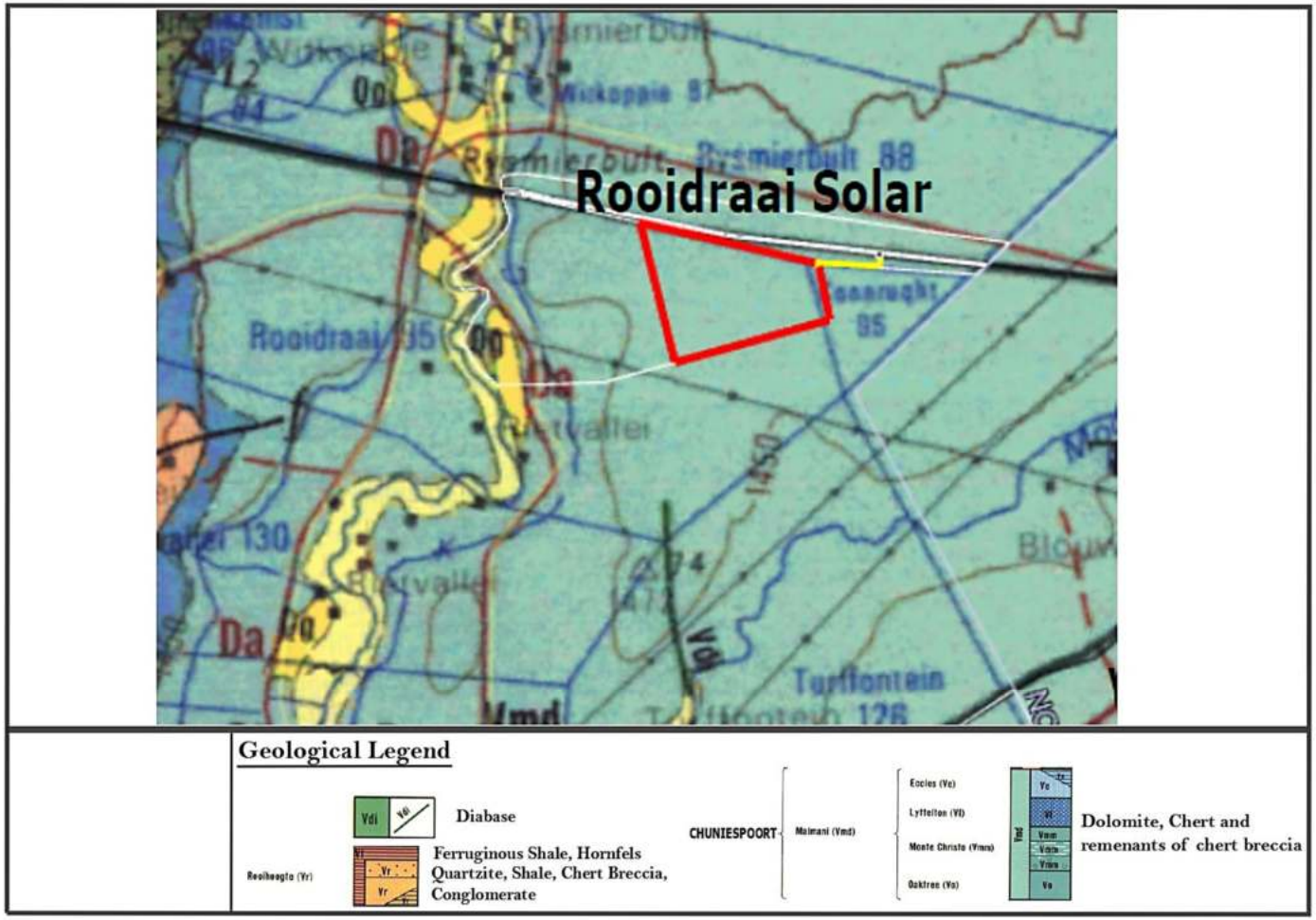


Figure 5.6: Geological plan and approximate site boundary

5.4.1.3 Topography

According to google earth imagery and elevation profiles the site is topographically flat to slightly undulating and covered with veld grasses and scattered small trees and shrubs and historically utilized as grazing land for livestock. A farm track bisects the site diagonally from NW to SE. Minor and sporadic rock outcrop is also indicated in satellite imagery. The site is slightly elevated relative to its surrounding and no major drainage lines are visible.

5.4.1.4 Soils and Agricultural Potential

According to the Agriculture Compliance Statement (attached in Appendix E5), the purpose of including an agricultural component in the environmental assessment process is to ensure that South Africa balances the need for development against the need to ensure the conservation of the natural agricultural resources, including land, required for agricultural production and national food security. The different categories of agricultural sensitivity, used in the national web-based environmental screening tool, indicate the priority by which land should be conserved as agricultural production land.

Agricultural sensitivity is a direct function of the capability of the land for agricultural production. All arable land that can support viable crop production, is classified as high (or very high) sensitivity. This is because there is a scarcity of arable production land in South Africa and its conservation for agricultural use is therefore a priority. Land which cannot support viable crop production is much less of a priority to conserve for agricultural use and is rated as medium or low agricultural sensitivity.

The screening tool classifies agricultural sensitivity according to only two independent criteria – the land capability rating and whether the land is used for cropland or not. All cropland is classified as at least high sensitivity, based on the logic that if it is under crop production, it is indeed suitable for it, irrespective of its land capability rating.

The screening tool sensitivity categories in terms of land capability are based upon the Department of Agriculture's updated and refined, country-wide land capability mapping, released in 2016. The data is generated by GIS modelling. Land capability is defined as the combination of soil, climate, and terrain suitability factors for supporting rain fed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land, based on its soil, climate, and terrain. The higher land capability values (≥8 to 15) are likely to be suitable as arable land for crop production, while lower values are only likely to be suitable as non-arable grazing land. A map of the proposed development area overlaid on the screening tool sensitivity is given in Figure 5.7.

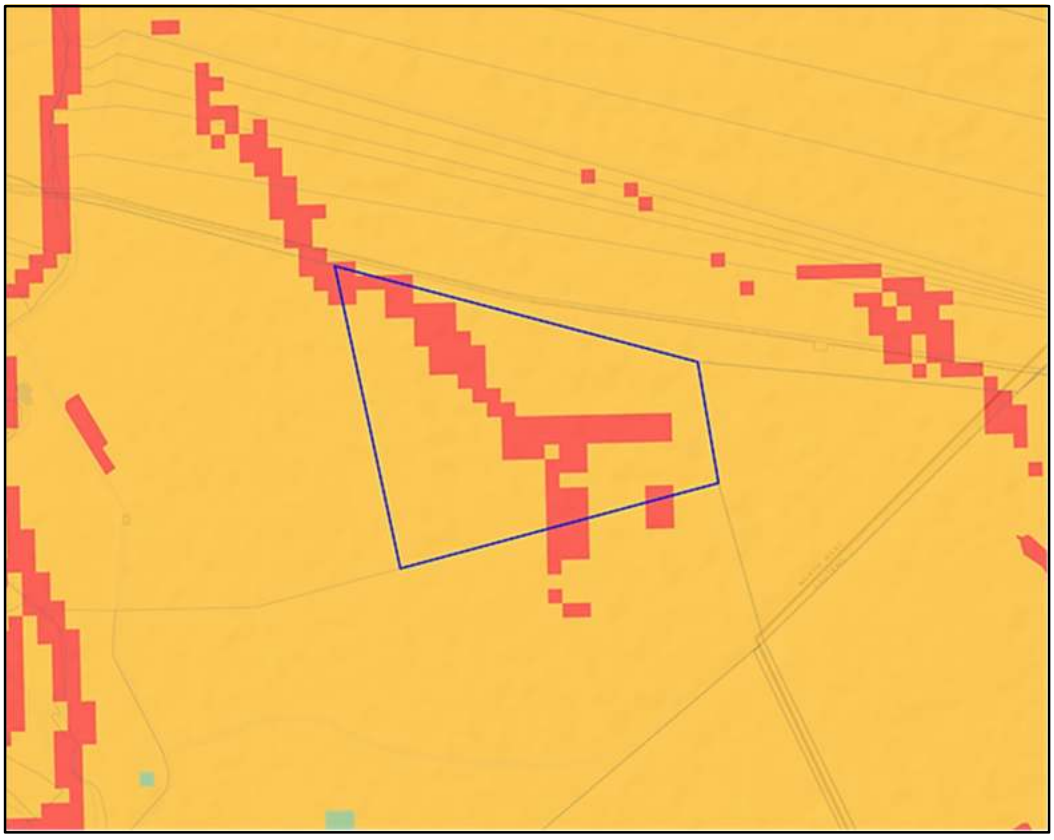


Figure 5.7: Agricultural sensitivity of the development footprint as per the results of the DFFE Screening Tool

None of the land is classified as cropland and agricultural sensitivity on the screening tool is therefore purely a function of land capability. The classified land capability of the sites is predominantly 8, but ranges from 7 to 10. The small-scale differences in the modelled land capability across the project area are not very accurate or significant at this scale and are more a function of how the data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. Values of 1 to 5 translate to a low agricultural sensitivity, values of 6 to 8 translate to a medium agricultural sensitivity and values of 9 to 10 translate to a high agricultural sensitivity.

The land across the site is assessed as being unsuitable for viable crop production. According to the land type data confirmed by the site sensitivity verification, the site is dominated by soils limited in depth by underlying bedrock. Due to their limited depth, such soils have insufficient moisture capacity to reliably carry a crop through the season. A generally reliable indication of soil cropping potential, or soil capability, is historical land use because the suitable versus the unsuitable soils get identified over time through trial and error. None of the land across the site has been used for crop production within the period covered by historical imagery available on Google Earth, which is eighteen years. This is further evidence that the site is highly unlikely to be suitable for viable crop production.

A land capability rating of ≥8 denotes land that is suitable for viable rain fed crop production. The land capability of this site is assessed as being < 8 due to the soil depth limitations and resultant lack of suitability for viable crop production. The high agricultural sensitivity of part

of the site, as identified by the screening tool, due to a classified land capability of up to 9, is therefore disputed by this assessment.

This site sensitivity verification verifies the entire site as having a land capability of less than 8 and therefore being of medium agricultural sensitivity. The required level of agricultural assessment is therefore confirmed as an Agricultural Compliance Statement.

5.4.1.5 Terrestrial and Aquatic Ecology

According to the terrestrial and aquatic ecological screening (attached in Appendix E2), understanding the conservation context and importance of the study area and surroundings is important to inform decision making regarding the management of the aquatic resources in the area. In this regard, available national, provincial, and regional conservation planning information was used to obtain an overview of the study site.

National Protected Areas Expansion Strategy (NPAES)

NPAES sets protected area targets, maps priority areas for protected area expansion, and makes recommendations on mechanisms to achieve this. NPAES is vital for ecological sustainability and climate change adaptation, serving as nodes in our ecological infrastructure network, protect the ecosystems that deliver important ecosystem services to people. According to the screening undertaken, the entire project site is located within a NPAES priorities Focus Area (FA). Refer to Figure 5.8 below.

This FA is approximately 349110.98 ha in size and has been identified as a FA due to this are being regarded as an important biodiversity corridor node within the province's conservation plan. The project site is approximately 406.92 ha and is located near the northern boundary of this FA. The proposed development would impact less than 1% of the FA (i.e., the final development footprint will be less than 406.92 ha). Thus, the development will result in the direct loss of less than 1% of this FA. However, due to the size and location of this SEF, direct impact on this FA can be regarded as negligible and will not impact the conservation targets set out for this FA.

The extent and significance of impacts can be significantly reduced to acceptable levels with the implementation of relevant mitigation measures.

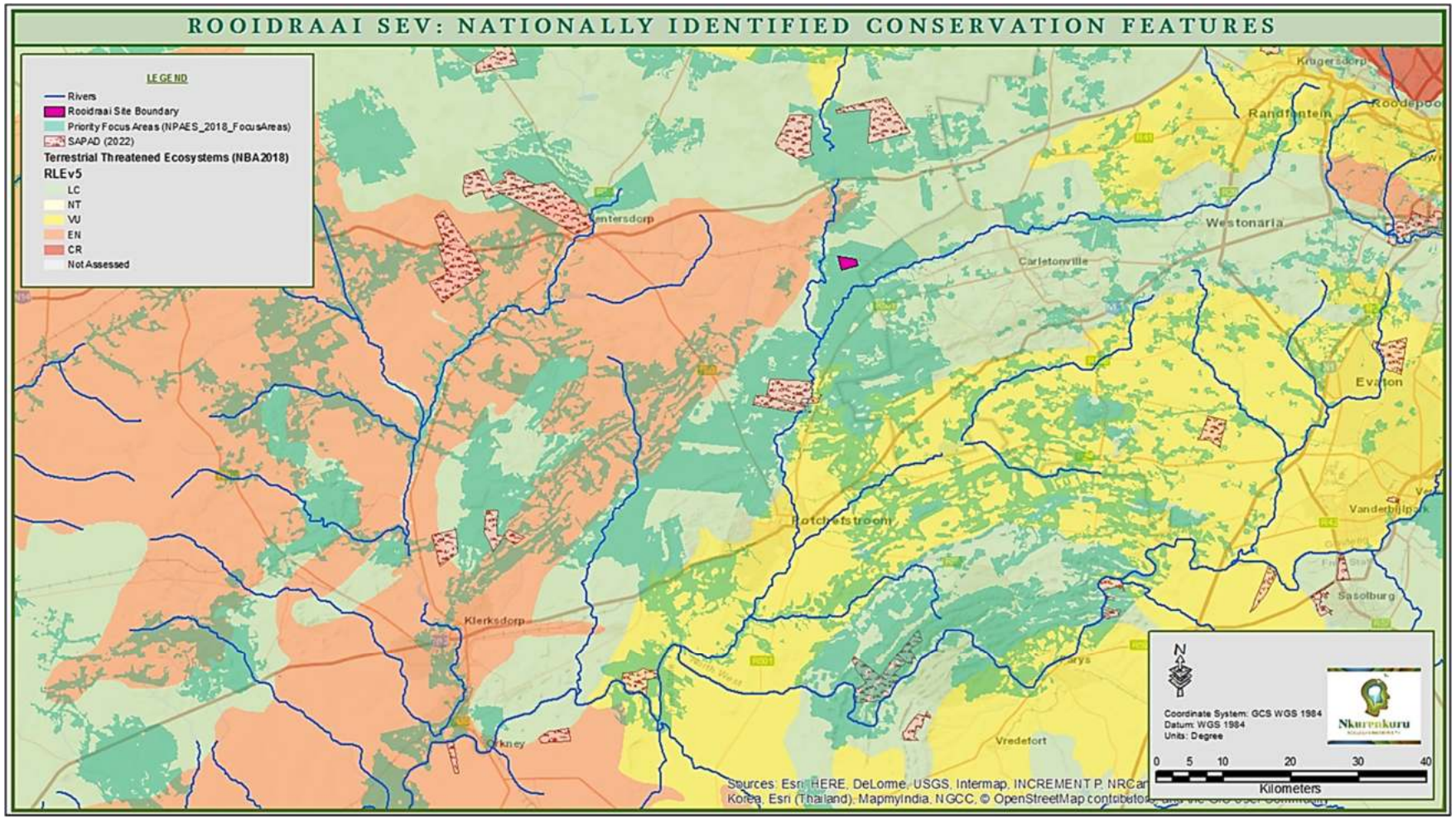


Figure 5.8: Nationally identified terrestrial conservation priority areas found within the greater surroundings of the Rooidraai PV Solar project site

Protected Areas and Conservation Areas (PACA) Database

In terms of South African Protected Areas (SAPA) and Conservation Areas (SACA), the site is not located within any Protected Area. The nearest SAPA, Magaliesberg Biosphere Reserve, is located approximately 46 km to the north/north-east of the project site, whilst the nearest SACA, Fred Coetzee Private Nature Reserve, is located approximately 17 km to the south-west of the project site. Refer to Figure 5.8 above.

The proposed development would not have an impact on any protected and conservation areas. Furthermore, with the implementation of applicable mitigation measures, there will be a significant impact on national conservation focus areas and targets.

Strategic Water Source Areas (SWSAs)

Strategic Water Source Areas (SWSAs) are defined as areas of land that either:

a) supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important;
b) have high groundwater recharge and where the groundwater forms a nationally important resource;
c) areas that meet both criteria mentioned above.

The project site is located outside of any SWSA for surface water but is located within a SWSA for ground water; namely the Far West Karst Region SWSA-gw. Due to the nature of SEF development, there is limited dependence on fresh water, avoidance of wetland and freshwater features, and limited use of chemicals, hazardous and toxic materials. Therefore, there is a low probability that such developments will have a significant impact on important groundwater resource features. The most likely impact will be a small local change in runoff and infiltration patterns, due to a local modification of roughage (vegetation cover) and natural geomorphology within and around the construction and infrastructure areas. However, these alterations should not be significant enough to impact recharge and general characteristics, drivers of this groundwater recharge area.

The National Freshwater Ecosystems Priority Areas (NFEPA)

The NFEPA, 2011, database provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports the sustainable use of water resources. The spatial priority areas are known as Freshwater Ecosystem Priority Areas (FEPAs).

No FEPA rivers are located in close proximity (within the affected sub-quaternary drainage regions) to the project site and as such no priority rivers will be impacted by the proposed development. The river drainage, the Upstream Management Area (UMA), the Mooirivierloop River is located approximately 3.3 km to the south-east of the project site, whilst the river draining to the Fish Support Area (FSA) is situated approximately 2.9 km to the west of the project site. Refer to Figure 5.9. As such, the proposed development is situated well away from any watercourse features (> 500m), and subsequently the proposed development will have no direct impact on such freshwater resource features.

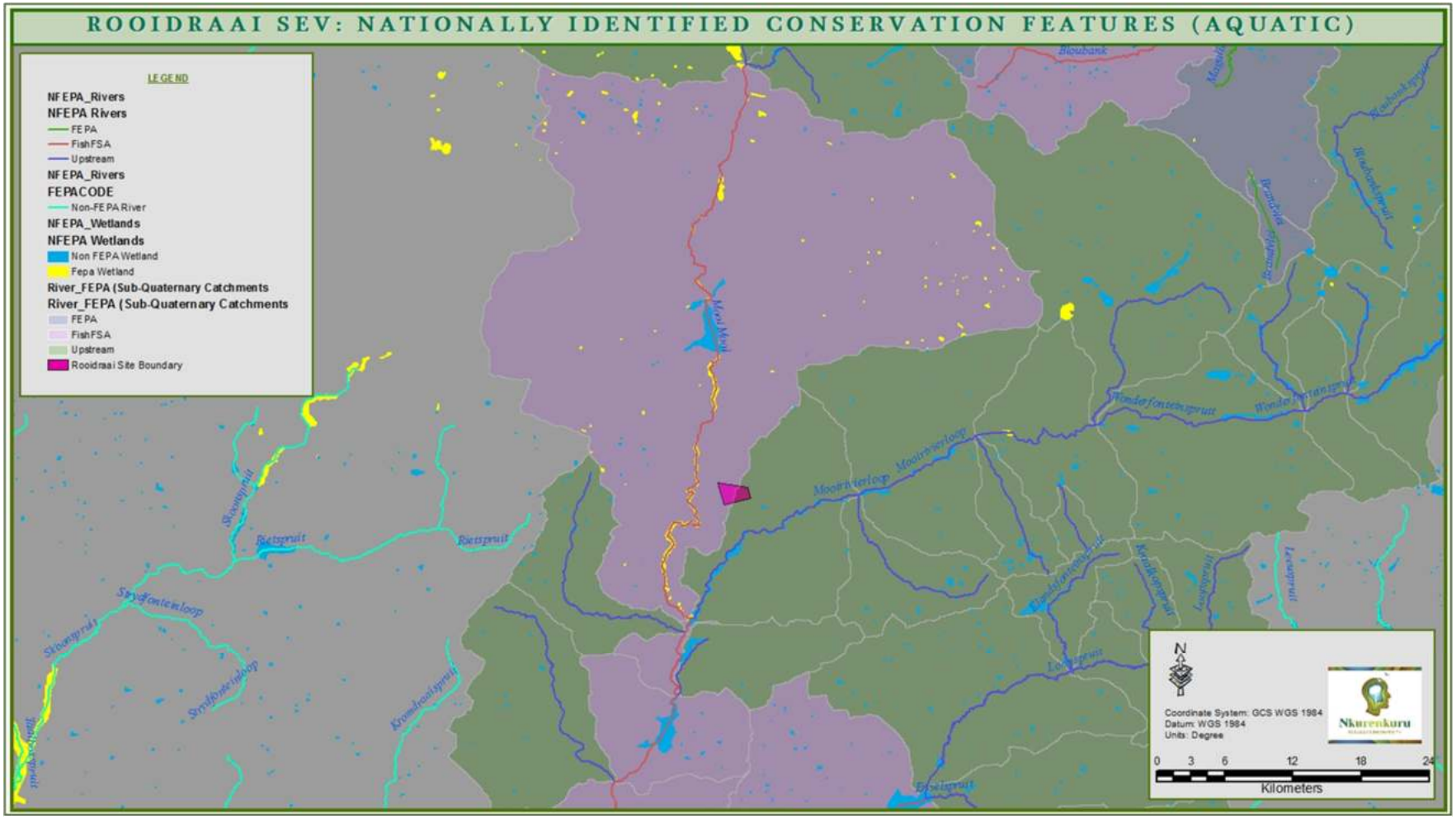


Figure 5.9: Nationally identified aquatic conservation priority areas found within the greater surroundings of the Rooidraai PV Solar project site.

According to the NFEPA spatial data, no wetland features are located in close proximity to the proposed project site (> 500 m). The closest wetland is a depression wetland located about 1.3 km to the south-east of the project site. The closest FEPA wetland is located approximately 1.7 km to the west of the project site and is a valley-bottom wetland associated with the Mooi River. It is also important to consider/compare SANBI's 2018 wetland map which similarly indicates that there are no wetland features within 500m of the proposed project site. Subsequently the proposed development will have no direct impact on such freshwater resource features.

No FEPA rivers and wetlands will be directly impacted by the proposed development. Furthermore, due to the nature, size and location (away from any freshwater resource features) of this SEF, the Rooidraai PV solar facility will not result in any significant/detrimental transformation (negligible small) of the FishFSA and Upstream prioritized sub-quaternary catchments and their associated drainage characteristic. Potential impacts on local drainage characteristics can be significantly and successfully mitigated.

Vegetation Type

The site includes a single vegetation type, as currently mapped by the National Vegetation Map 2018, namely the Carletonville Dolomite Grassland. This vegetation type is listed as Least Threatened; thus, no listed ecosystems occur on site. Refer to Figure 5.8 above.

Carletonville Dolomite Grassland

The unit is classified as Least Threatened with a target of protection of 24%. Very little of this vegetation unit is currently protected (2.2%), however it is estimated that 76.1% of this vegetation unit is still intact. Only a small portion is statutorily conserved (Sterkfontein Caves – Cradle of Humankind World Heritage Site, Oog van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugerdorp, Olifantsvlei, Groenkloof) (Mucina & Rutherford, 2006). Major land use activities that have contributed to the transformation of 23.9% of this vegetation unit include, cultivation, urban sprawl, mining activities and the construction of the Boskop and Klerksraal dams. Erosion is generally very low (84%). The unit is currently mapped to cover an extensive area size of approximately 11209.08 km^2 (SANBI, 2018).

Table 5.1: Conservation status of the vegetation type occurring in and around the study area

Vegetation Type	Target (%)	Transformed (%)	Conserved (Statutorily & other reserves)	Conservation Status	
				National Vegetation Map (2018)	National Ecosystem List (NEMA:BA)
Bushmanland Arid Grassland	24%	23.9%	2.2%	Least Concerned	Not Listed

Critical Biodiversity Areas and Broad Scale Ecological Processes

According to the North West Biodiversity Conservation Plan (2018):

- *Critical Biodiversity Areas (CBAs)* are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of

ecosystem services. In other words, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (READ, 2015).

- *Ecological Support Areas (ESAs)* are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs (READ, 2015).

The entire project site has been classified as an ESA 1 and CBA 2 which are identified as follows:

CBA category	Land Management Objective
CBA 2	***Near-natural landscapes:*** » Ecosystems and species largely intact and undisturbed. » Areas with intermediate irreplaceability or some flexibility in terms of the area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve targets. » Landscapes that are approaching but have not passed their limits of acceptable change. ***Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process.***
ESA 1	***Functional landscapes:*** » Ecosystem still in a natural, near-natural state or semi-natural state, and has not been previously developed. » Ecosystem moderately to significantly disturbed but still able to maintain basic functionality. » Individual species or other biodiversity indicators may be severely disturbed or reduced. » Areas with low irreplaceability with respect to biodiversity pattern targets only. ***Maintain in at least a semi-natural state as ecologically functional landscapes that retain basic natural attributes.***

Refer to Figures 5.10 and 5.11 below.

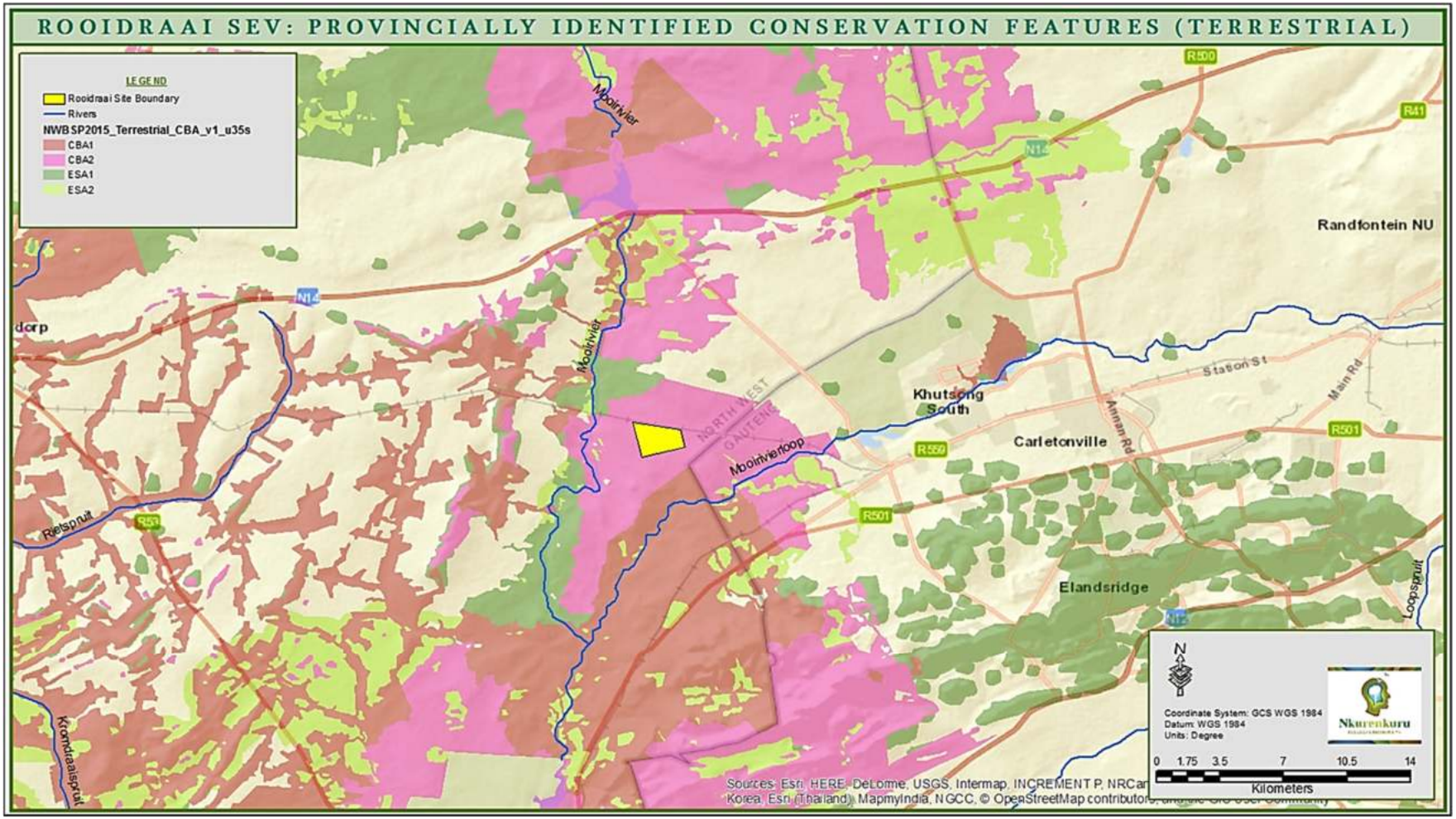


Figure 5.10: Terrestrial Critical Biodiversity Areas (CBA) found within the greater surroundings of the Rooidraai PV Solar project site

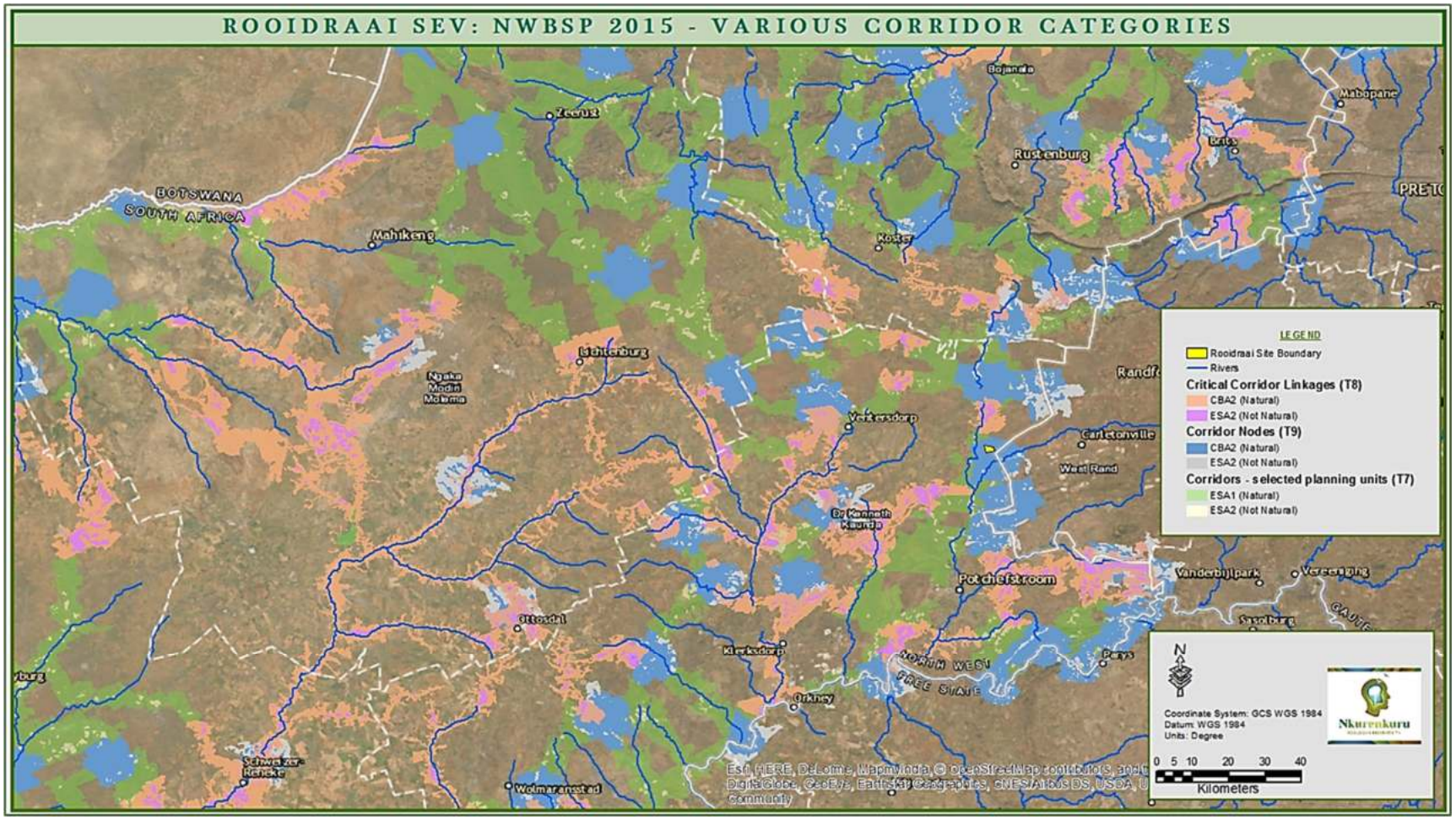


Figure 5.11: Biodiversity corridors, critical corridor linkages and nodes found within the greater surroundings of the Rooidraai PV Solar project site

The proposed project has a direct impact on ESA. However, due to the relatively small size of the development relative to the extent of natural habitat present along the corridor, and the location of the project site within the corridor, it is highly unlikely that this development will threaten the functionality and integrity of this corridor.

The project site is also located within a CBA 2. Taking into account the fairly small impact area, the location of this node (CBA 2) towards the north and the extent of remaining natural and intact biodiversity within the remaining portion of the node, the loss of this is (406.9 ha) should not affect the functions and services associated with this node, as well as the conservation targets set out for this area. Furthermore, this impact can be significantly reduced to acceptable levels with the meticulous and careful implementation of relevant mitigation measures.

A detailed assessment on terrestrial ecology including plant and animal species will be undertaken during the detailed EIA phase and once a final layout becomes available.

5.4.1.6 Wetlands and Riparian Features

According to the Aquatic Ecological Assessment (Appendix E1), the greater study area (20 km) radius was dominated by three major types of natural aquatic features and a number of artificial barriers associated with catchments and rivers, characterised as follows:

- Watercourses with Channelled Valley Bottom Wetlands;
- Grassland seepages areas; and
- Depressions, dominated by grass species

The artificial barriers included dam, weirs and voids (pits) created by previous mining activities. The study area is situated predominantly within the Gauteng Shale Mountain Bushveld (Svcb10) and Carletonville Dolomite Grassland (Gh15) vegetation units, associated with the upper reaches of the Mooirivierloop River catchment (C23E) and Mooi River (C23G) catchments (Figure 5.12).

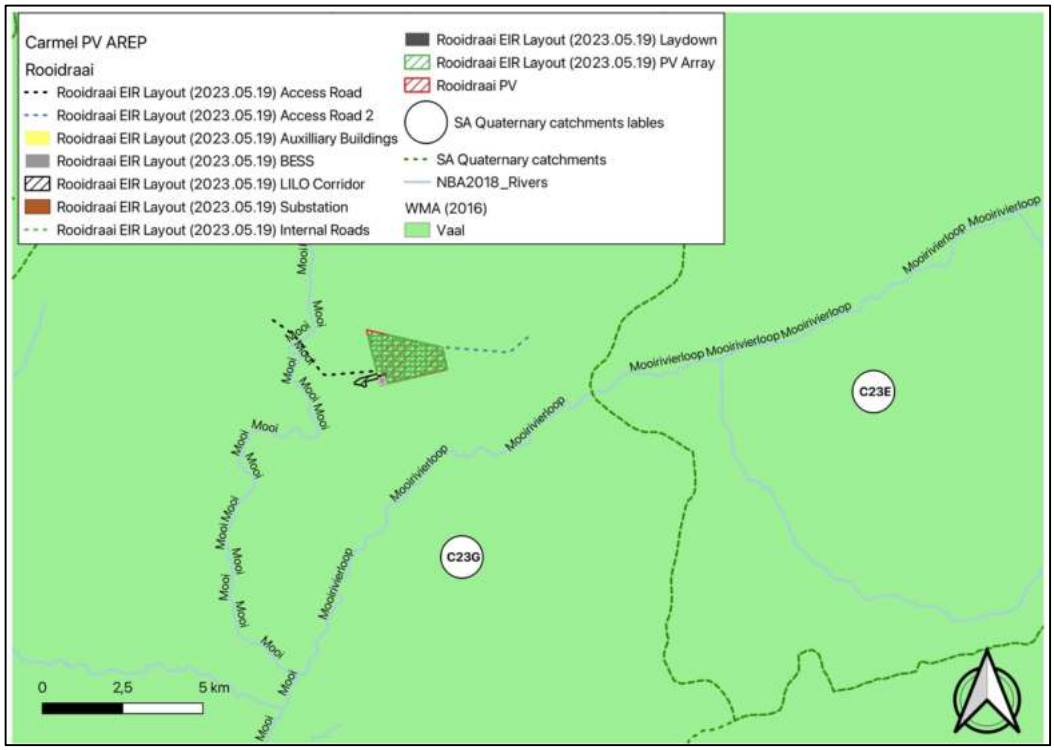


Figure 5.12: Locality map indicating the various quaternary catchments and mainstream rivers within the proposed project's boundaries

The study area is characterised by grasslands and alien vegetation stands, as well as past mining activities, and present farming practices. The project site is well away from any wetland areas identified in the surrounding properties, i.e., Very High Sensitivity habitats. Refer to Figure 5.13.

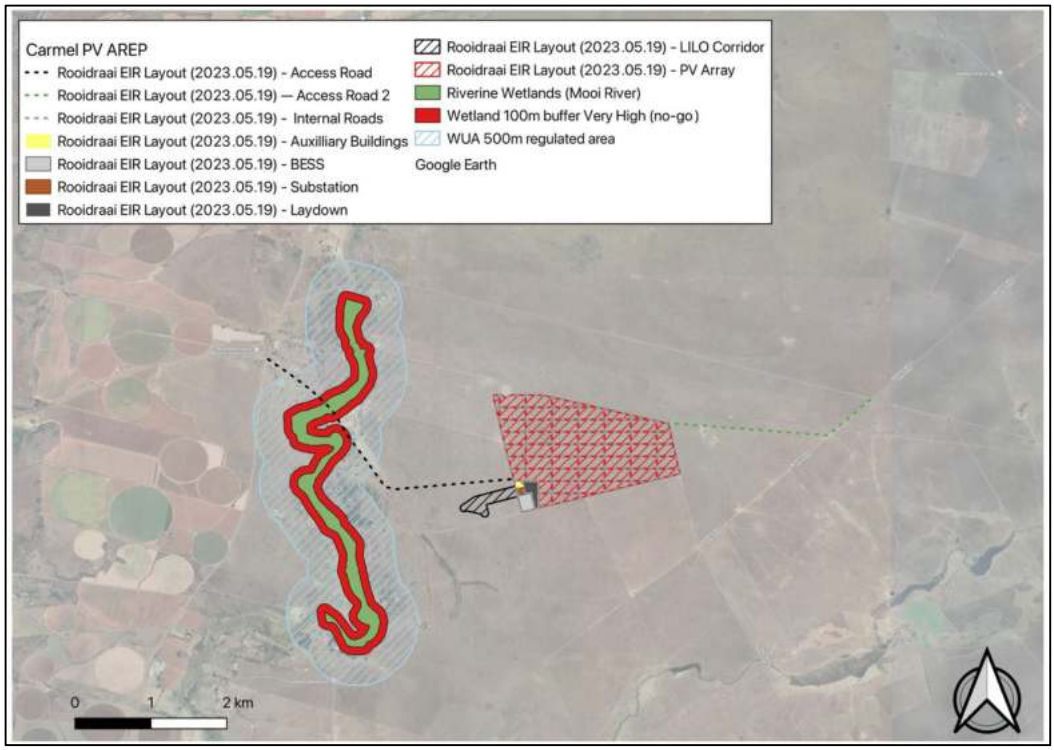


Figure 5.13: Waterbodies delineated in this assessment based on ground-truthing information collected for the Rooidraai site

Site Sensitivity

Table 5.2 below provides an overview of the sensitivity of features (with buffers distances included) as it relates to the main project component types for the project.

The sensitivity ratings of High No-Go to Low were determined through an assessment of the habitat sensitivity and related constraints. However, these No-Go areas (with buffers) relate in general terms to the project and there are areas where encroachment on these areas would occur (i.e., existing road crossings within systems and considered acceptable since these areas have already been impacted).

In summary, structures such as PV Panel Areas, buildings, substations and Battery Energy Storage System (BESS), should be placed outside of the High Sensitivity habitats, while remaining structures (roads and transmission lines) could cross or span the Moderate / Low Sensitivity areas. Noting that Low Sensitivity can also = Moderate areas but with existing impacts e.g., current roads, farm tracks of previously disturbed areas but these must be confirmed during the remainder of the assessment phases for areas such as roads or grid access.

Table 5.2: Results of the sensitivity rating/constraints assessment

Map Key	Sensitivity Rationale	Buffer	Features Identified on Site	Development Constraints and override exceptions
High = No Go	"No go" areas or setbacks and areas or features that are considered of such significance that impacting them may be regarded as fatal flaw or strongly influence the project impact significance profile Therefore areas or features that are considered to have a high sensitivity or where project infrastructure would be highly constrained and should be avoided as far as possible. Infrastructure located in these areas are likely to drive up impact significance ratings and mitigations	100m	Channelled Valley Bottom wetlands	No buildings or structures (e.g., PV Panel Areas, Substations, O/M Buildings or temporary laydown areas should be placed within these zones.
Medium/Moderate	Areas that are deemed to be of medium sensitivity but should still be avoided as this would minimise impacts and or the need for additional Water Use Authorisation in the case of any aquatic features	22m to aid delineation accuracy and prevent bank instability	Drainage lines	No buildings or structures (e.g., PV Panel Areas, Substations, O/M Buildings or temporary laydown areas should be placed within these zones. Access roads and grid connection can span these areas, but preferably where existing impacts already occur
Low	Areas of low sensitivity or constraints such as artificial systems with little to no biological value or would not result in any future licensing requirements e.g. dry earth wall farm dams. While from a terrestrial perspective the vegetation or habitat is ubiquitous within the greater region or has seem some form of disturbance.	N/A	Artificial voids / dams	N/A
Neutral	Unconstrained areas (left blank in mapping) from aquatic perspective	N/A		N/A

5.4.1.7 Avifaunal

Avifaunal Species Richness

According to the Avifaunal Scoping Report (Appendix E3), approximately ~132 bird species have been recorded within the Rooidraai Solar study area. The richness was inferred from the South African Bird Atlas Project (SABAP2) (Harrison et al., 1997; www.sabap2.birdmap.africa) and the presence of suitable habitat in the study area. This equates to 13 % of the approximate 991 species listed for the southern African subregion (and approximately 22% of the 871 species recorded within South Africa). However, the species richness obtained from the pentad grids corresponding to the proposed footprint sites (c. 2620_2705 and 2620_2710) is lower and range between 11 and 83 species, with an average number of 49 species for each full protocol card submitted (for observation of two hours or more).

According to field observations (February and June 2023), the total number of species observed on the study area is *ca*. 71 species. The observed richness is indicative of the monotonous nature of the dominant habitat unit on the study site, which was comparably impoverished in species numbers. According to Table 1, the study area is poorly represented by biome-restricted and local endemic bird species (refer to Table 5.4).

Table 5.3: A summary table of the total number of species, Red listed species (according to Taylor et al., 2015 and the IUCN, 2022), endemics and biome-restricted species (Marnewick

et al., 2015) expected (sensu SABAP1 and SABAP2) to occur in the study site and immediate surroundings.

Description	Expected Richness Value (study area and surroundings)***	Observed Richness Value (study area)****
Total number of species*	132 (15 %)	71 (54 %)
Number of Red Listed species**	7 (5 %)	2 (29 %)
Number of biome-restricted species – Zambezian and Kalahari-Highveld Biomes*	2 (14%)	1 (50 %)
Number of local endemics (BirdLife SA, 2022)*	2 (5 %)	2 (100 %)
Number of local near-endemics (BirdLife SA, 2022)*	5 (17 %)	2 (40 %)
Number of regional endemics (Hockey *et al.*, 2005)**	12 (11 %)	9 (75 %)
Number of regional near-endemics (Hockey *et al.*, 2005)**	12 (20 %)	10 (83 %)

Table 5.4: Expected biome-restricted species (Marnewick et al, 2015) likely to occur on the study site and immediate surroundings

Species	Kalahari-Highveld	Zambezian	Expected Frequency of occurrence
Kalahari Scrub-robin (*Cercotrichas paena)*	X		Common (restricted to bush clumps)
White-bellied Sunbird (*Cinnyris talatala*)		X	Highly irregular – probably absent

Table 5.5. provides an overview of bird species of conservation concern that could occur on the proposed study areas based on their historical distribution ranges and the presence of suitable habitat. According to Table 5.5, a total of seven species have been recorded within the Rooidraai Solar area. The seven species include two globally threatened species, two globally near threatened species, two regionally threatened species and one regionally near-threatened species.

It is evident from Table 5.5 that the highest reporting rates (>5%) were observed for the globally endangered Cape Vulture (Gyps coprotheres) This species have a high likelihood of occurrence pending the presence of suitable food (livestock carcasses) and was also observed roosting (c. 30-50 individuals) on existing powerline pylons located to the east (approximately 618-800m from the study site) and south of the study site (approximately 750m from the study site) (refer to Figure 12 and Figure 13). Due to the close proximity of a vulture restaurant to

the study site (~20km of the site), the Cape Vulture is regarded as a regular foraging visitor to the area. In addition, the regionally vulnerable Lanner Falcon (Falco biarmicus) was observed on the study area (Figure 12) and represented a single adult foraging bird. It is regarded as an occasional foraging visitor to the area and was observed for the first time in February 2023 on the study area.

The remaining species have low reporting rates and are regarded as irregular or uncommon foraging visitors with low probabilities of occurrence. However, during the surveys it was noticed that extensive areas of suitable foraging habitat persists for some of these species (e.g. Secretarybird Sagittarius serpentarius) despite being ominously absent from the area. It is possible that the low reporting rates reflect the poor coverage of the study area by citizen scientists (e.g. birdwatchers), although it may have been displaced from the area due to current grazing regimes (e.g. persistent disturbances).

Table 5.5: Bird species of conservation concern that could utilise the proposed study areas and immediate surroundings based on their historical distribution range and the presence of suitable habitat. Red list categories according to the IUCN (2022)* and Taylor et al. (2015)**

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: Rooidraai Solar	Preferred Habitat	Potential Likelihood of Occurrence
Circus ranivorus (African Marsh Harrier)	-	Endangered	4.35 (recently recorded during 2022 and known a two observations)	Restricted to permanent wetlands with extensive reedbeds.	Unlikely to occur due to the absence of suitable habitat. The nearby Wonderfonteinspruit (Mooirivierloop) and the Mooi river provide suitable habitat for this species to be present.
Circus macrourus (Pallid Harrier)	Near threatened	Near threatened	2.17 (known from a single observation during 2011)	Dry and moist open grassland, especially in the vicinity of wetland systems	Regarded as an irregular summer foraging visitor to the study areas. The floodplain of the Wonderfonteinspruit (Mooirivierloop) and the Mooi river located near the Rooidraai Solar site provide potential habitat for this species to occur.
Glareola nordmanni (Black-winged Pratincole)	Near threatened	Near threatened	2.17 (known from a single observation during 2012)	Varied, but forages over open short grassland, pastures and agricultural lands (especially when being tilled)	Regarded as an uncommon to fairly regular foraging visitor to the study areas.
Falco biarmicus (Lanner Falcon)	-	Vulnerable	New record for the study area	Varied, but prefers to breed in mountainous areas.	An occasional foraging visitor to the study area. A single adult bird was observed soaring and hunting over the study site (17 February 2023 @ 07:51 AM).
Gyps coprotheres (Cape Vulture)	Endangered	Endangered	8.70 (known from two observations, the most recent being June 2023)	Mainly confined to mountain ranges, especially near breeding site. Ventures far afield in search of food.	A regular foraging/scavenging visitor to the respective study areas pending the presence of food (e.g., livestock carcasses).

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: Rooidraai Solar	Preferred Habitat	Potential Likelihood of Occurrence
					It is regarded as a regular passage visitor (soaring overhead) to nearby vulture restaurants.
Phoenicopterus roseus (Greater Flamingo)	-	Near threatened	2.17 (last recorded during 2013 from a single observation)	Restricted to large saline pans and other inland water bodies.	A highly irregular foraging visitor to the physical development footprint sites due to the absence of suitable habitat. Birds could disperse between the Wonderfonteinspruit (Mooirivierloop) and the Mooi river located near the Rooidraai Solar site and may potentially fly over the site and interact with the PV panels and electrical infrastructure.
Sagittarius serpentarius (Secretarybird)	Endangered	Endangered	2.17 (last recorded during 2012 from a single observation)	Prefers open grassland or lightly wooded habitat.	Regarded as a potential foraging visitor to the Rooidraai Solar. Probably displaced due to current grazing regimes and the absence of suitable nesting platforms.

A preliminary sensitivity map was compiled, illustrating habitat units comprising of potential sensitive elements based on the following:

- Areas of high sensitivity – The artificial livestock watering points are expected to attract large numbers of granivore passerine and non-passerine bird species, of which many need to drink water on a daily basis (e.g. doves). The placement of electrical and PV infrastructure in close proximity to these areas could increase potential avian collisions with the infrastructure. The water point in the northwest corner of the site, was identified as a no-go area and has been avoided. In addition, the close proximity of cattle feedlots (mainly associated with the artificial watering points) and the high potential for livestock carcasses provide opportunistic foraging habitat for threatened scavenging birds (e.g. vultures). This habitat is of artificial origin and could be relocated to other areas.

- Areas of medium sensitivity – It includes the open grassland and bush clump mosaics which are prominent in the wider study region and provides potential suitable foraging habitat for some collision-prone bird species, including the Northern Black Korhaan (Afrotis afraoides) with the potential to interact (e.g. collide) with the proposed electrical infrastructure. In addition, reporting rates for threatened and near threatened bird species are anticipated to be relatively low for these units, thereby suggesting a medium sensitivity rating instead of a high sensitivity even though the majority of the habitat is natural.

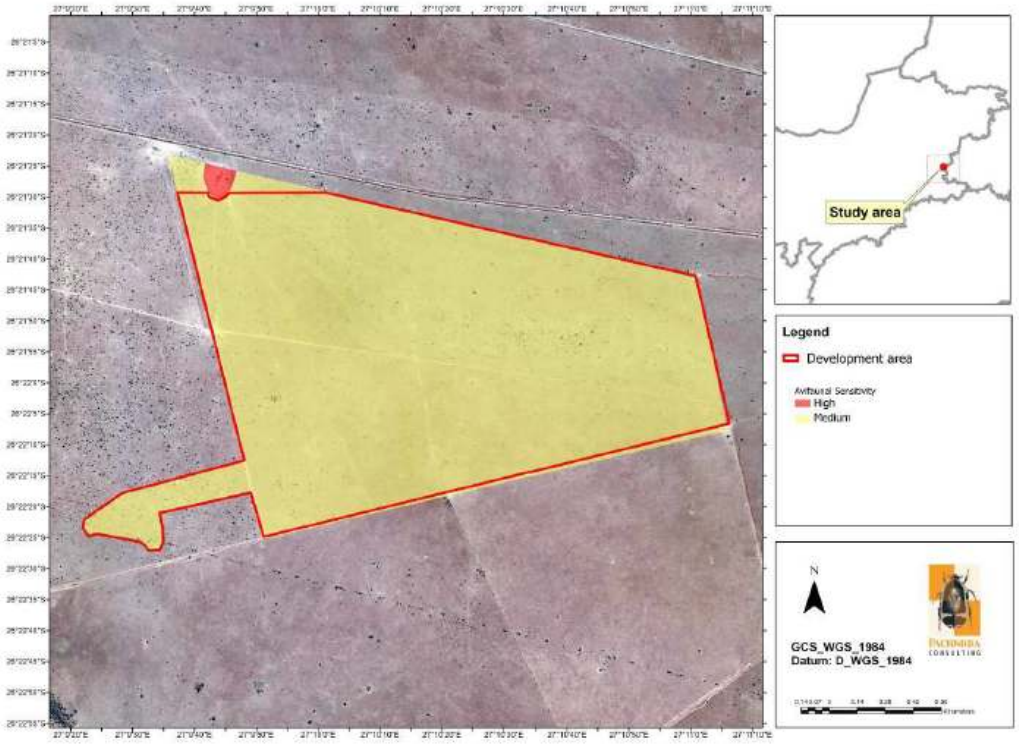


Figure 5.14: A map illustrating the preliminary avifaunal sensitivity of the Rooidraai Solar facility based on habitat types supporting bird taxa of conservation concern and important ecological function

5.4.2 Cultural and Heritage Aspects

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a limited pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one consisting of a number of smaller towns, most of which developed during the last 150 years or less. Added to this is the development of a number of gold mines in the region.

From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing, for which limited infrastructure such as watering points, were developed.

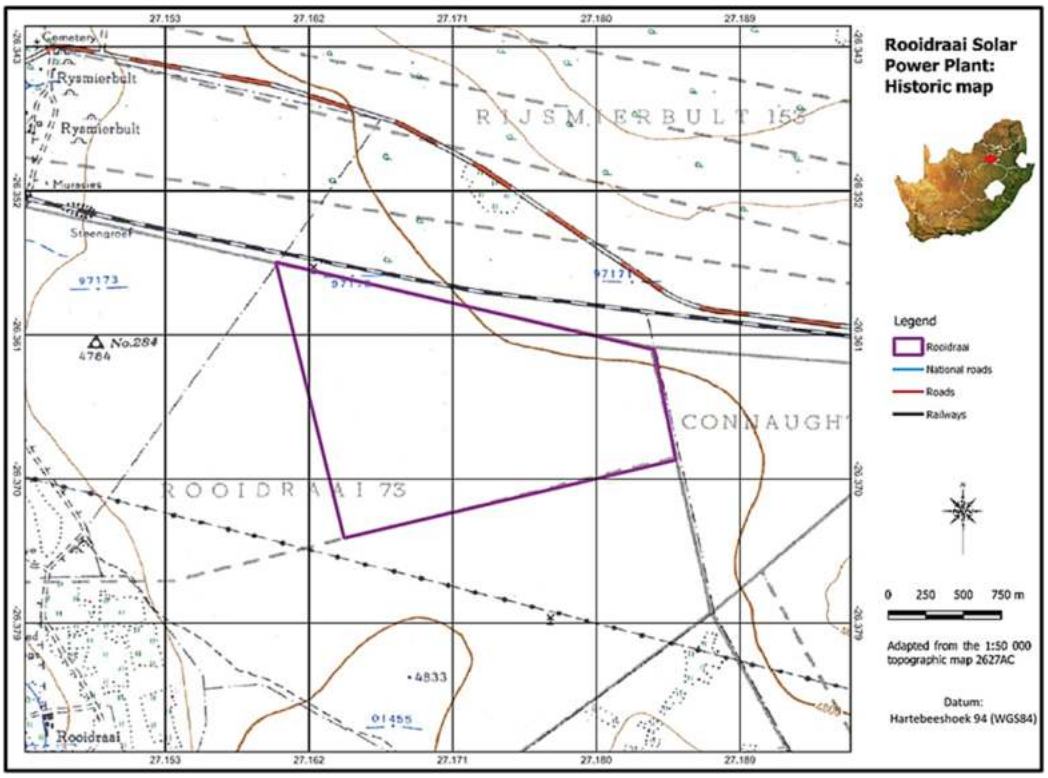


Figure 5.15: Aerial view of the project area dating to 2022

Figure 5.16: The project area on the 1958 version of the 1:50 000 topographic map

During the survey, the following sites, features and objects of cultural significance were identified in the project area.

5.4.2.1 Historical, Archaeological and Built Environment

Stone Age

Very little habitation of the central highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g., the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. In many cases, tools dating to this period are found on the banks of the many pans that occur all over. The MSA is a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. The repeated use of caves indicates that MSA people had developed the concept of a home base and that they could make fire. These were important steps in the cultural evolution of humanity. Furthermore, the widespread use of red ochre, presumably as body paint, also shows that MSA behaviour had become more human.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the region. These are mostly open sites located near river and pans. For the first time we also get evidence of people's activities derived from material other than stone tools. Ostrich

eggshell beads, ground bone arrowheads, small, bored stones and wood fragments with incised markings are traditionally linked with the LSA.

The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes. It is essentially religious (Lewis-Williams 1981). Among other aspects, the art expresses beliefs about the role of shamans in controlling rain and game, and animals of power, such as eland and rhino, figure prominently.

No sites, features or objects of cultural significance dating to the Stone Age were identified in the project area.

Iron Age

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

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province. In areas devoid of trees, Sotho-Tswana-speakers built in stone to mark internal and external boundaries. Because of the need for stone, most stonewalled settlements were sited near rocky outcrops. Typically, a rubble core filled the space between two outer faces. Most were similar in that animal enclosures formed a circle around a central open space. Adult cattle stayed in large enclosures in the circle and calves in the smaller kraals. The number of adult kraals reflects the number of cattle-owning families living in the homestead. If there is only one family, then only one kraal stands in the centre without a central open space.

This was also a period of great military tension. Armed Qriqua and Korana raiders on horseback were active in the northern Cape and Orange Free State by about 1790. The Xhosa were raiding across the Orange River about 1805. Military pressure from Zululand spilled onto the highveld by at least 1821. Various marauding groups of displaced Sotho Tswana moved across the plateau in the 1820s. Mzilikazi raided the plateau extensively between 1825 and 1837. The Boers trekked into this area in the 1830s. And throughout this time settled communities of Tswana people also attacked each other.

As a result of this troubled period, Sotho Tswana people concentrated into large towns for defensive purposes. In some instances, they took shelter in caves such as in Irene in Pretoria and at Lephalong, where they developed a whole town inside a cave (Hall 1995).

The earliest Iron Age settlers who moved into the North-West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the Bakwena baMare-a-Phogole who settled under their chief Kokosi in the region of Losberg south of Fochville (Vorster 1969:52).

Stone walled sites dating to the Late Iron Age and which can probably be linked to the baMare-a-Phogole occupation of the area, are found on the farm Kraalkop, which is possibly the origin of the fam's name.

This type of settlement has been classified as belonging to the Molokwane settlement type, which originates with the Western Tswana groups such as the Hurutshe. According to Huffman (2007:41) this type of settlement stretches across the hilly areas of Gauteng west to Zeerust and they date from the late eighteenth century to the beginning of the historic period. The sites of Jachtfontein clearly shows the typical layout of these settlement, showing amalgamation into larger units increasing from west to east.

No sites, features or objects of cultural significance dating to the Iron Age were identified in the project area.

Historic period

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Few towns were established, and it remained an undeveloped area until the discovery of coal and later gold. Potchefstroom was established in 1838, with Parys following a bit later in 1876, and following much later, Fochville in 1920 and Carletonville in 1948.

In 1837 the establishment of a trekker settlement at Klerksdorp marked the beginning of a new phase in the history of the region. Originally twelve trekker families settled on the farm Elandsheuvel, belonging to C.M. du Plooy. This settlement, known as 'Oude Dorp', had its first landdros Jacob de Clercq, after which the settlement was then named. In 1853, the name was changed to Klerksdorp. With the discovery of gold in 1886 on the farm Rietpoort, the gold rush gave rise to a new settlement called 'Nieuwe Dorp'. In 1897 the railway line from Krugersdorp reached Klerksdorp. The railway line from Fourteen Streams (Warden region), on the main line from Kimberley to Zimbabwe (then Rhodesia) was completed in 1906. (SESA 1973).

Gold made the Transvaal powerful, but it also created a clash between the Republicans and British immigrants who rushed to the goldfields. The ZAR government denied political rights to these Uitlanders, precipitating the ill-timed Jameson Raid of 1895/6. As is well known, Uitlander support did not materialize, and Jameson surrendered on January 2, 1896, near Krugersdorp.

During the Anglo-Boer War, a number of skirmishes occurred in the larger area. Most of these had to do with the British using the Vaal River as a border to catch the elusive Boer commandos. One such event took place in early August 1900, when Lord Methuen, coming from the south, forced Gen. De Wet across the Vaal River at Venterskroon, forcing the latter to retreat in the direction of what later was to become Fochville (Cloete 2000). What became known as the Battle of Frederickstad, located to the west of the project area, took place on 20 to 25 October 1900. Due to the hesitancy of Gen. P. J. Liebenberg to commit his forces to the battle, lead to a large number of them killed, whereas the British did not suffer as much. The Republican dead were buried near the Frederickstad railway station (Van den Bergh 1996).

No sites, features or objects of cultural significance dating to the historic period were identified in the project area.

5.4.2.2 Palaeontology

The Rooidraai Solar development is underlain by the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Malmani Subgroup is Very High (Almond et al, 2013; SAHRIS website).

Figure 5.17: Extract of the 1: 250 000 SAHRIA PalaeoMap (Council) of Geosciences) indicating the proposed Rooidraai Photovoltaic Solar Energy Facility

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the weekend of the 3 November 2022. Outcrops of weathered to fairly well-preserved stromatolites were discovered on the development as follows:

- Well preserved oolites and stromatolites located close to the western site boundary at GPS: -26.364272; 27.162486.
- Weathered stromatolites outcrops located in the centre of the development at GPS: -26.363878; 27.172133.
- Well-developed concentric layers of stromatolite mats at GPS: -26.364869; 27.172631.

Mitigation of a sample of well-preserved stromatolites is thus recommended. By implementing mitigation measures the significance of the impact will be reduced to Low. A buffer of 30 m should be placed around the stromatolites on the western margin of the development. And if a well-preserved stromatolite outcrop is uncovered in the development footprint (after vegetation clearance) the stromatolites may be cordoned off and a buffer of 30 m may be placed around the outcrop or a reprehensive example should be removed and

placed near the offices of the PV as an informative example of fossils in the area. Mitigation should take place after initial vegetation is cleared away but before the ground is levelled for construction. These recommendations will be included in the Environmental Management Plan for the PV facility.

5.4.3 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.

5.4.3.1 Visual Receptors

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 from the proposed development, which due to use could be sensitive to landscape change. They include:

- **Area Receptors** which include:
  - Welverdiend.
  - Boskop Rysmierbult.
  - Abe Bailey Nature Reserve.
- **Linear Receptors** which include:
  - R501 regional road.
  - Rysmierbult Witpoort tar road.
- **Point Receptors** which include:
  - Homesteads on farms.
  - Smallholdings.
  - Sports and Recreational facilities.
  - Tourism and lodging facilities.

5.4.3.2 Zone of Theoretical Visibility

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

Table 5.6: ZTV Assumptions

Radius	Impact Magnitude
0-1km	Very High
1-3km	High
3-5km	Medium
5-10km	Low

Table 5.7 below reflects the visibility rating in terms of proximity on sensitive receptors from the SEF within a 10km radius.

Table 5.7: ZTV rating in terms of proximity from the SEF

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	No sensitive visual receptors are present within this radius. **Coverage: 76%**	Very High
1-3km	- Three homesteads on farms. - Boskop Rysmierbult settlement. **Coverage: 22%**	High
3-5km	- Six homesteads on farms. - Rysmierbult Witpoort tar road. - One Christian church. **Coverage: 21%**	Medium
5-10km	- 21 homesteads on farms. - R501 regional road. - Abe Bailey Nature Reserve. **Coverage: 24%**	Low

Figures 5.18 and 5.19 reflects the theoretical visibility. These distances were calculated according to experience, assumptions and opinion. The ZTV maps will give a clearer understanding of areas susceptible to line of sight from the SEF.

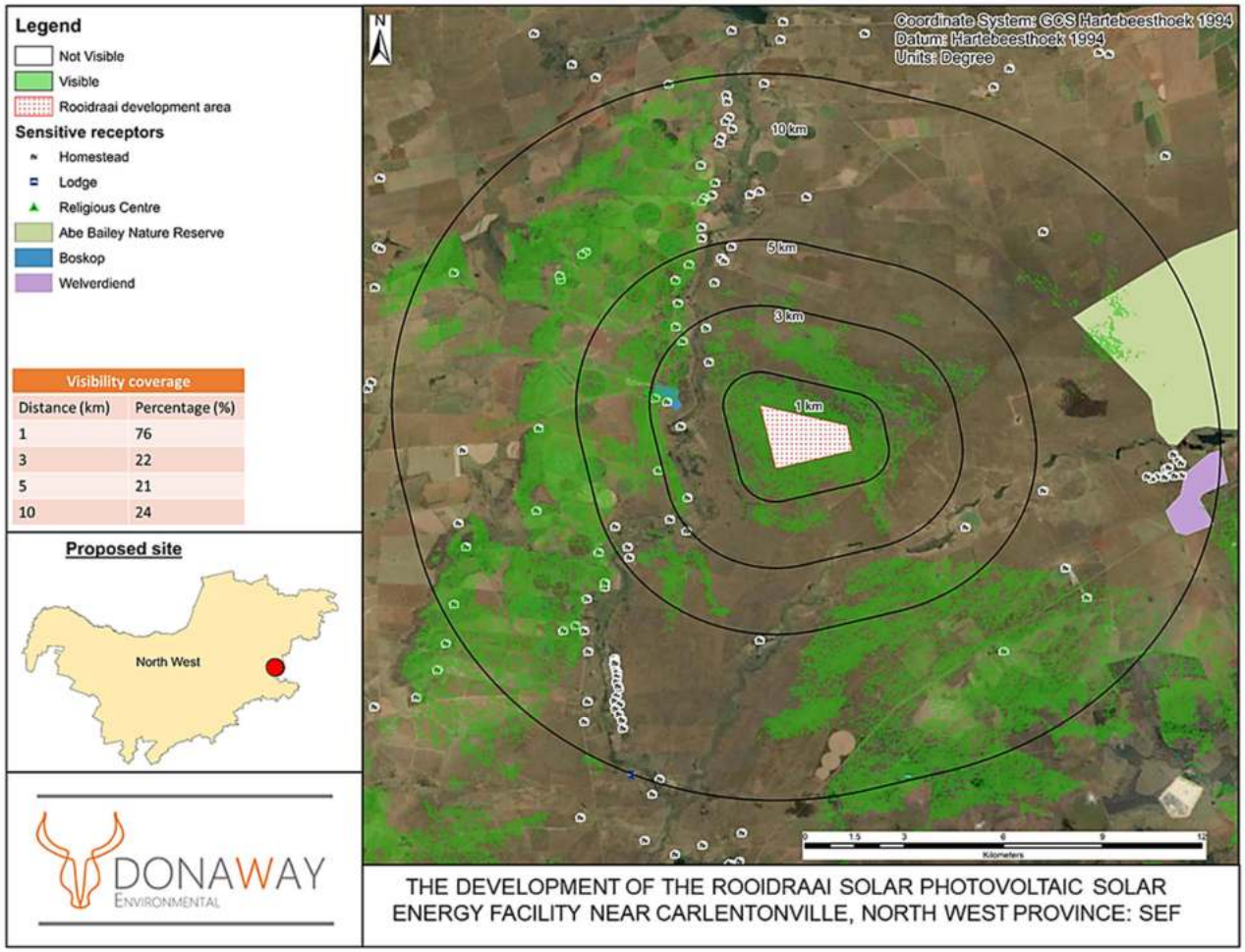


Figure 5.18: ZTV for the SEF, satellite view

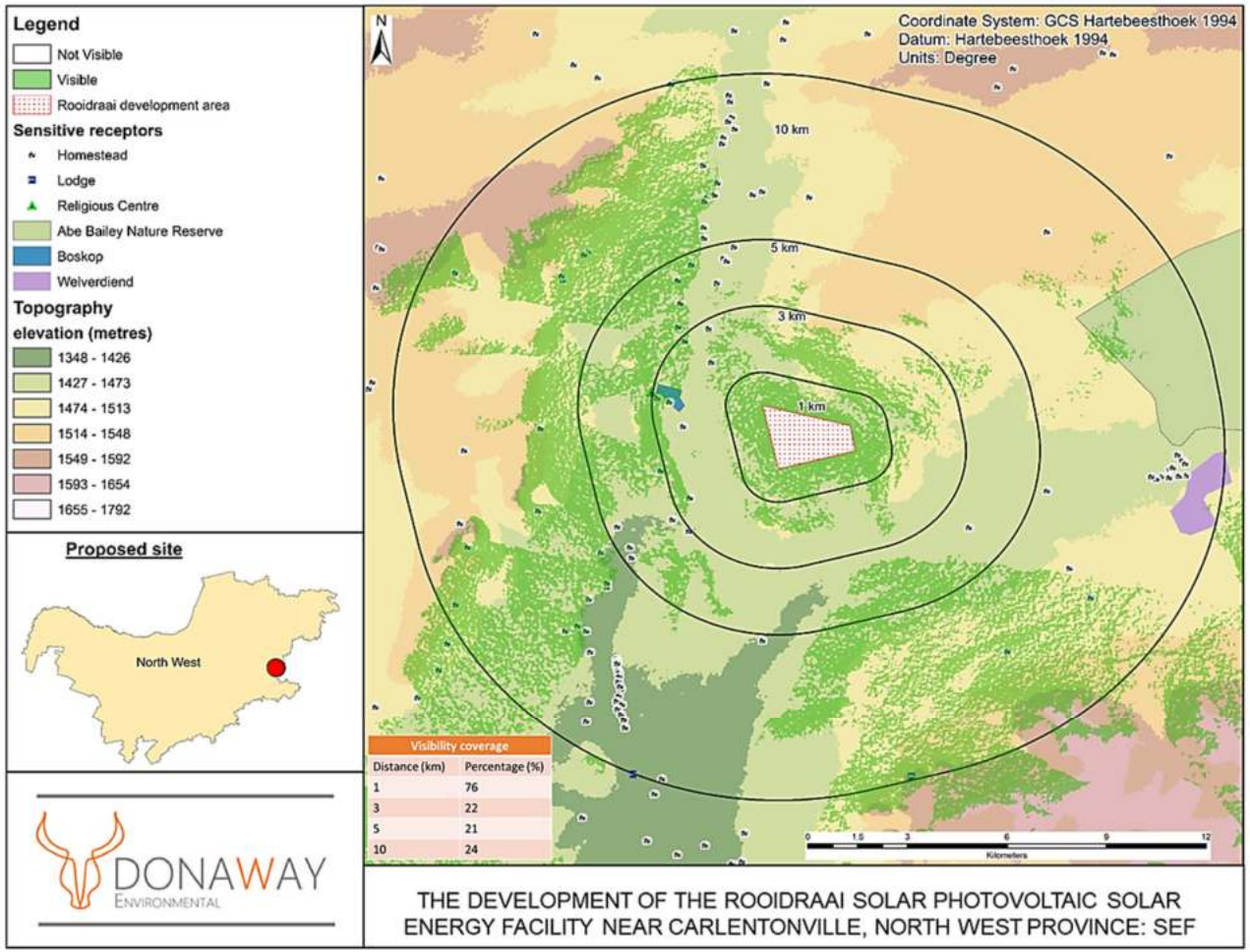


Figure 5.19: ZTV for the SEF, topography view

Table 5.8. below reflects the visibility rating in terms of proximity on sensitive receptors from the Powerline (PL) within a 10 km radius.

Table 5.8: ZTV rating in terms of proximity to the PL

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	No sensitive visual receptors are present within this radius. **Coverage: 99%**	Very High
1-3km	No sensitive visual receptors are present within this radius. **Coverage: 58%**	High
3-5km	- Four homesteads on farms. - Boskop Rysmierbult settlement. **Coverage: 29%**	Medium
5-10km	- 35 homesteads on farms and smallholdings. - Welverdiend. - Abe Bailey Nature Reserve. - R501 regional road. - Boskop Rysmierbult settlement. - Rysmierbult Witpoort tar road. - One Christian church. **Coverage: 37%**	Low

Figures 5.20 and 5.21 reflects the theoretical visibility. These distances were calculated according to experience, assumptions and opinion. The ZTV maps will give a clearer understanding of areas susceptible to line of sight from the PL.

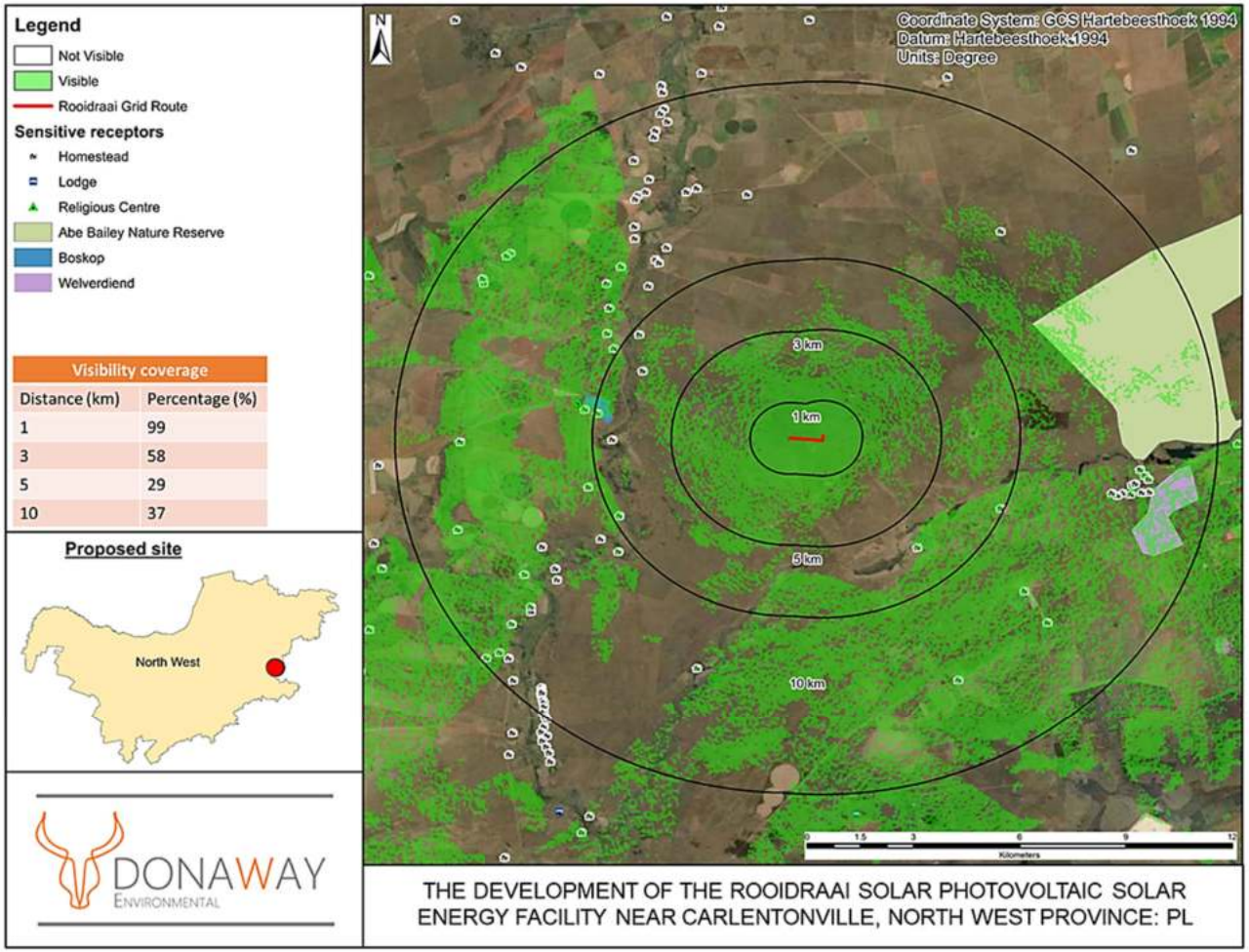


Figure 5.20: ZTV for the PL, satellite view

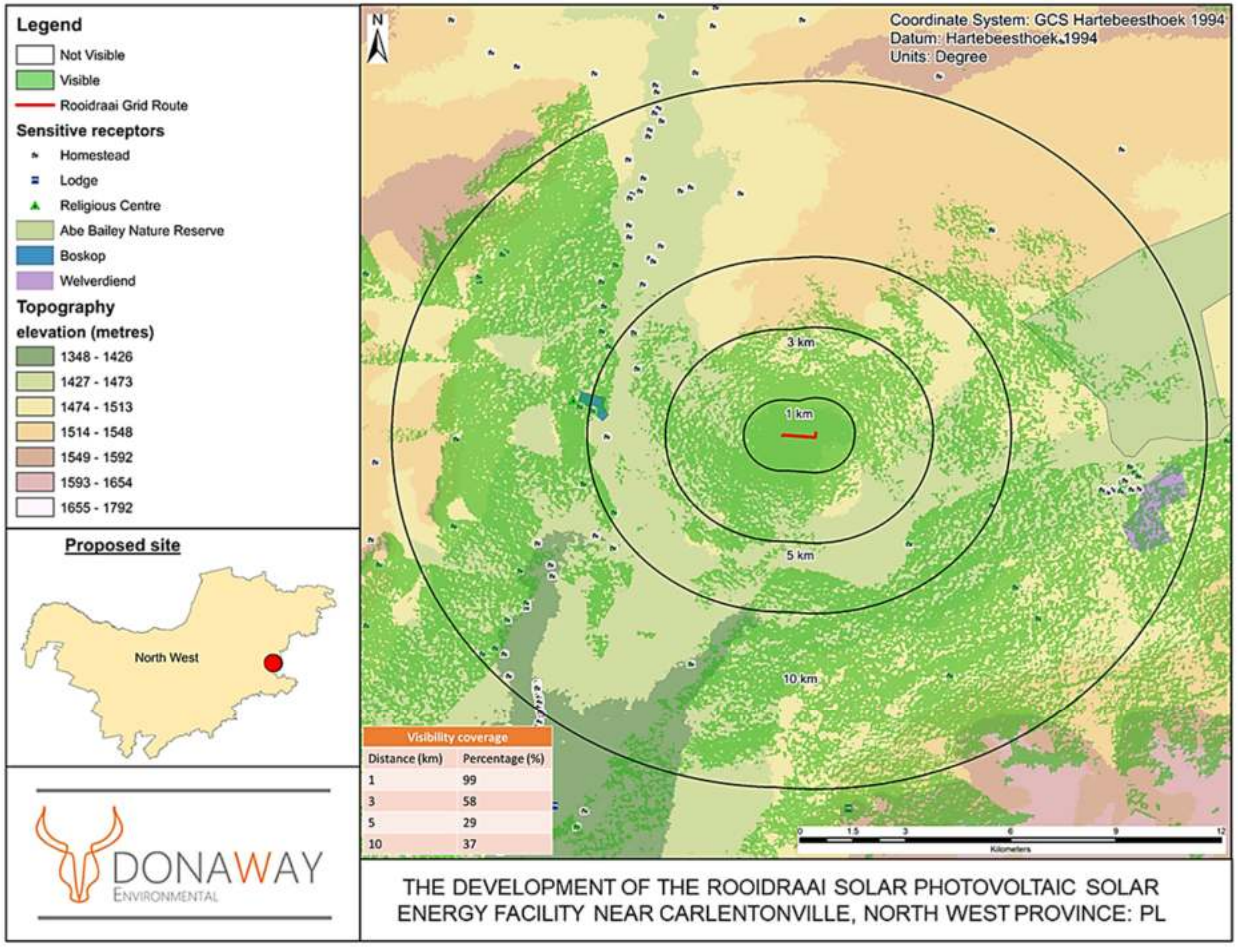


Figure 5.21: ZTV for the PL, topography view

The only receptors likely to be impacted by the proposed development are the nearby property owners, the Boskop Rysmierbult settlement and the Rysmierbult Witpoort tar road. However, a large part of the visual landscape is still reflecting a farming landscape and intensive mining landscape, beyond the 10km radius, with a much lower visual quality.

5.4.4 Traffic Consideration

5.4.4.1 Access Points

The assessment of possible accesses took into consideration any existing access gates and access spacing requirements, required sight lines and road safety considerations. A railway line passes the Rooidraai Solar to the north. If access is intended crossing this railway line, the respective wayleave applications will need to be in place with Transnet. Trying to make use of established farm roads as much as possible and taking into account the river bed to the south of the site, the access route from the R501 to the Rooidraai Solar site as shown in Figure 5.22 is recommended. However, further investigation will need to be done at detail design stage in regard to the exact alignment of the last route section to the site. The turnoff from the R501 towards the site is shown which is at an established farm road. Sight lines in both directions on the R501 are suitable.

General

The access route leading needs to be wide enough for heavy vehicles and large construction vehicles to navigate (minimum width of 8 m should be kept). The radii at bends along the access route need to be large enough to allow for all construction vehicles to turn safely. It is further recommended that the access point onto the site be security controlled during the construction phase. Sight distances on the R501 are deemed good; however, any sight line limitations will need to be addressed (i.e., cutting back of trees or shrubbery that obstruct a clear view of the road ahead).

Internal Roads

The geometric design and layout for the internal roads from the recommended access points need to be established at detailed design stage. Existing structures and services, such as drainage structures, signage and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that the gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed.

The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

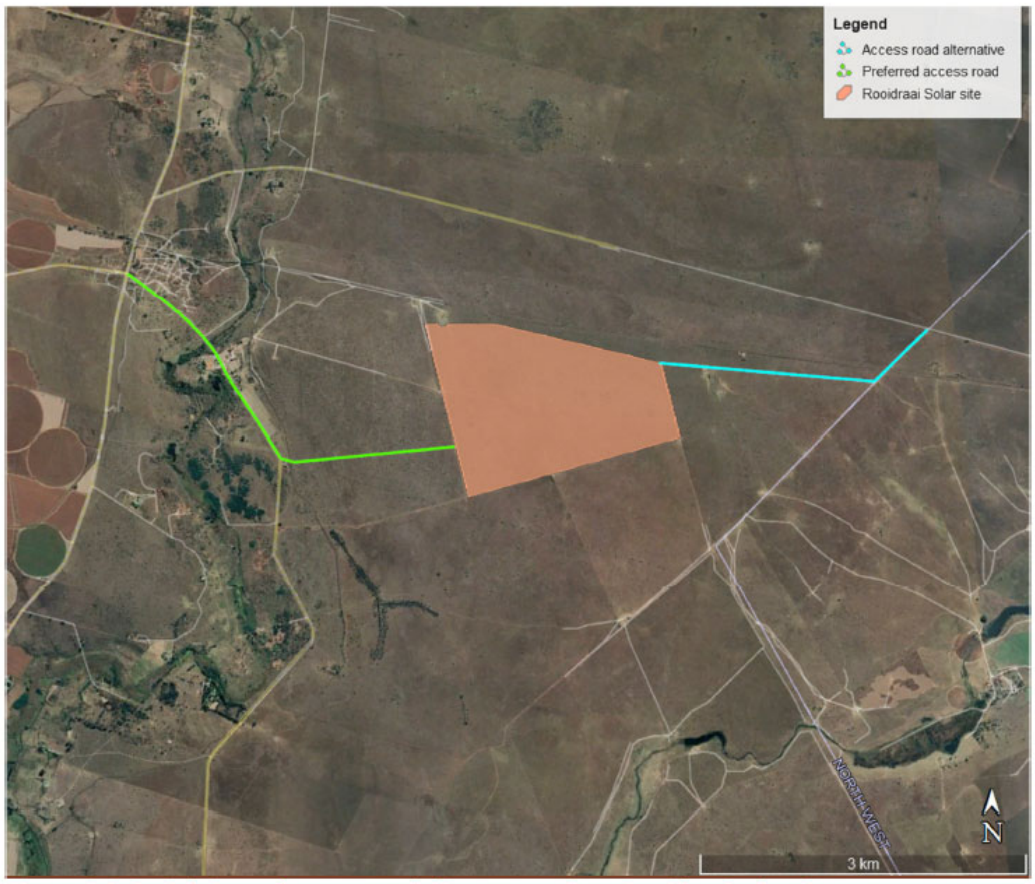


Figure 5.22: Aerial view of recommended access routes to Rooidraai solar site

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

5.4.5 Description of the Socio-Economic Environment

The socio-economic environment is described below.

5.4.5.1 Socio-Economic Conditions

In accordance to the Social Impact Assessment (Appendix E8), an overview of the socio-economic environment within which Rooidraai SEF is proposed for development is provided below as well as the socio-economic basis against which potential issues can be identified.

North West Province

North West lies in the north of South Africa on the Botswana border, fringed by the Kalahari Desert in the west, Gauteng province to the east and the Free State to the south. It covers an area of 104 882 km² and has a population of 3 748 436. Much of the province consists of flat

areas of scattered trees and grassland. The Vaal River flows along the southern border of the province.

Mahikeng (previously Mafikeng) is the capital. The city lies near the Botswana border and forms a single urban area with its neighbouring town, Mmabatho. Potchefstroom and Klerksdorp are the biggest cities in the province. Other main towns are Brits, Rustenburg, Klerksdorp and Lichtenburg. Most economic activity is concentrated in the southern region between Potchefstroom and Klerksdorp, as well as Rustenburg and the eastern region. Mining is the major contributor to the North West economy and represents almost a quarter of South Africa's mining industry as a whole. The Rustenburg and Brits districts produce more platinum than any other single area in the world. North West also produces a quarter of South Africa's gold, as well as granite, marble, fluorspar and diamonds. North West has a number of major tourist attractions, including the internationally famous Sun City, the Pilanesberg National Park, the Madikwe Game Reserve and the Rustenburg Nature Reserve.

North West is well known for cattle farming, while the areas around Rustenburg and Brits are fertile, mixed-crop farming land. Maize and sunflowers are the most important crops, and the province is the major producer of white maize in the country.

North West is divided into four district municipalities, which are further subdivided into 18 local municipalities.

Dr Kenneth Kaunda District Municipality

The Dr Kenneth Kaunda District Municipality (DM) is a Category C municipality in the North West Province. It is located 65 km south-west of Johannesburg and borders the Gauteng Province on that side. It is the smallest district in the province, making up 14% of its geographical area. The municipality consists of three local municipalities: JB Marks, City of Matlosana and Maquassi Hills.

It is a region with a rich and diverse natural and cultural heritage, with the potential for sustained economic growth. The region is home to some of the most prominent gold mines in the world and one of the oldest meteor impact sites in the world. The district is serviced by a number of primary roads, with the N12 Treasure Corridor forming the main development axis in the district and serving as a potential concentration point for future industrial, commercial and tourism development. The DM covers an area of 14 671 km² and consists of the Following towns: Hartbeesfontein, Klerksdorp, Leeudoringstad, Makwassie, Orkney, Potchefstroom, Stilfontein, Carletonville, Witpoort, Wolmaransstad. The main economic sectors include Community services (28.7%), trade, (23.2%), finance (13.1%), construction (8.3%), manufacturing (8.2%), agriculture (7.6%), mining (6.1%), transport and communications (4.3%). In 2011 the Municipality had a population of 695 933 with a dependency ratio of 51.1. By 2016 the population has increased to 742 821 and the dependency ratio was reduced to 51.9.

JB Marks Local Municipality

The JB Marks Local Municipality is a Category B municipality situated within the Dr Kenneth Kaunda District in the North West Province. It is the largest municipality of three in the district,

making up almost half its geographical area. It was established by the amalgamation of the Carletonville and Tlokwe City Council Local Municipalities in August 2016. The N12 route that connects Johannesburg and Cape Town via the city of Kimberley runs through the municipality. The main railway route from Gauteng to the Northern and Western Cape also runs through one of the municipality's main cities, Potchefstroom. The city is 145 km south-east of OR Tambo International Airport but has its own airfield, which can accommodate bigger aircraft and was formerly a military air base. The LM consists of two towns namely: Potchefstroom and Carletonville and covers an area of 6 398 km².

Gold mining is the dominant economic activity in the district, with Potchefstroom and Carletonville being the only exceptions. While Carletonville to the north-west of Potchefstroom focuses on agricultural activity, Potchefstroom's economic activity is driven by services and manufacturing. A big role-player in the provision of services in Potchefstroom is the world-class North-West University, which has its main campus in Potchefstroom.

Potchefstroom's industrial zone has many companies, focusing mainly on the industries of steel, food and chemicals, with big entities such as King Korn, Kynoch, Naschem and the Soya Protein Process (SPP) company. Within the city centre, the infrastructure of Potchefstroom supports roughly 600 businesses. The main economic sectors in the municipality are Agriculture, community services, manufacturing, trade, finance, transport, mining.

5.5 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 North West Province has a high potential for the generation of power from solar.

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities (i.e., the grid connection points are located within the affected property which minimizes the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). Reminder of Portion 10 of the Farm Rooidraai No. 85 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. North West receives high averages of direct normal and global horizontal irradiation, daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of ~2118 kWh/m^2/year is relevant in the area.
- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the

panels do not occur. The topographic conditions, which are favourable, minimizes the significance of the impact that will occur during the clearing and leveling of the site for the construction activities.

- Extent of the site: A significant portion of land is required to evacuate the prescribed 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 Reminder of Portion 10 of the Farm Rooidraai No. 85; 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 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 capitalizing hamper efforts to find suitable farms. Access will be obtained via the R501 Regional 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.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 of this report. The area proposed for development consists of land used for agricultural cattle grazing. The site falls within a CBA 2 and ESA.

It is evident from the discussion above that the Reminder of Portion 10 of the Farm Rooidraai No. 85, may be considered favourable and suitable in terms of the site and environmental characteristics. As mentioned previously, no alternative areas on the property have been considered for the placement of the development footprint as the assessed development footprint comprises of minimal sensitive features. The development footprint of this project will cover a significant portion of the farm; however, provision has been made to exclude any sensitive areas from the facility layout to be developed within the development footprint.

5.6 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 the fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of the 150 MW Rooidraai Solar PV Facility on the Reminder of Portion 10 of the Farm Rooidraai No. 85 is the preferred option.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

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

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

(v) the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;

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

(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; and

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

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

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

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

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

(i) cumulative impacts;

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

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

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

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

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

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

6.1 SCOPING METHODOLOGY

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

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

6.1.1 Checklist Analysis

The independent consultant conducted a site visit on 12 October 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland		×		The Mooiriver is located more than 500 m away from the proposed project. However, the expansion of the existing access roads as required by the project will be undertaken within 32m from the watercourse.
II. A conservation or open space area	×			According to the terrestrial and aquatic ecology screening, the site is located within a CBA 2 and ESA.
III. An area that is of cultural importance		×		No sites, features or objects of cultural significance were identified.

IV. Site of geological significance		✕		None.
V. Areas of outstanding natural beauty		✕		None.
VI. Highly productive agricultural land		✕		None.
VII. Floodplain		✕		None.
VIII. Indigenous Forest		✕		None.
IX. Grass land	✕			According to the terrestrial and aquatic ecology screening, the site is currently natural grassland.
X. Bird nesting sites		✕		The Avifauna Scoping Assessment (refer to Appendix E3) does not make any reference to nesting sites on the area earmarked for the development.
XI. Red data species		✕		The Avifauna Scoping Assessment (refer to Appendix E3) did not record any Red Data Species on site but indicated that some species of conservation concern may occur on site.
XII. Tourist resort		✕		None.
2. Will the project potentially result in potential?				
I. Removal of people		✕		None.
II. Visual Impacts	✕			The VIA (refer to Appendix E4) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners, the Boskop Rysmierbult settlement and the Rysmierbult Witpoort tar road.
III. Noise pollution	✕			Construction activities will result in the generation of noise over a period of 18-24 months. The noise impact is unlikely to be significant.
IV. Construction of an access road	✕			Site access has been proposed via the R501 Regional Road and existing farm roads.

V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	×			Approximately 240 employment opportunities will be created during the peak construction phase and approximately 25 employment opportunities during the operation phase of the PV facility.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during the facility's 20 years of production is approximately 9547kl per annum.
VIII. Job creation	×			Approximately 240 employment opportunities will be created during the peak construction phase and approximately 25 employment opportunities during the operation phase of the PV facility.
IX. Traffic generation	×			It was estimated that approximately 148 daily site trips will be made which comprises of solar component delivery; staff transport; and material delivery.
X. Soil erosion	×			The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		×		None.

3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			The Mooiriver is located more than 500 m away from the proposed project. However, the expansion of the existing access roads as required by the project will be undertaken within 32m from the watercourse.
II. A conservation or open space area	×			According to the terrestrial and aquatic ecology screening, the site is located within a CBA 2 and ESA.
III. An area that is of cultural importance		×		None.
IV. A site of geological significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. A tourist resort		×		None.
VIII. A formal or informal settlement	×			The town of Carletonville is located approximately 19 km south east of the proposed development.

6.1.2 Matrix Analysis

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

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

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

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

Table 6.2: Matrix analysis

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

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 12(ii)(a)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."* Activity 19 (GN.R. 327): *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."*	Site clearing and preparation Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Terrain levelling if necessary – Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation – The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths – The majority of the access road will follow existing, gravel farm roads that may require widening up to 10 m (inclusive of storm water infrastructure). Where new sections of road	BIOPHYSICAL ENVIRONMENT	Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-
			Geology	• Collapsible soil. • Seepage. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes.	-		S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	-

Activity 24(ii) (GN.R. 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."* Activity 28(ii) (GN.R. 327): "*Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* Activity 56(ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* Activity 1 (GN.R. 325): *" The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more"* Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."* Activity 4(h)(iv) (GN.R. 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres*	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 of up to 33 km, each with a width of up to 6 m, will be constructed to provide access to the various components of the PV development. • 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. Transportation and installation of PV panels into an Array The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw. Wiring to the Central Inverters Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.			• Areas subject to seismic activity.										
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality
			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Aquatic Ecology	• Loss of habitat containing protected species or Species of Special Concern • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones. • Loss can also include a functional loss, through change in vegetation type via alien encroachment, reducing aquatic biodiversity.	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Loss of CBAs or potential areas with conservation potential • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)

within (h) North West province, (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority." <u>Activity 10(h)(iv) (GN.R. 324):</u> *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."* <u>Activity 12(h)(iv)(vi) (GN.R. 324):</u> *"The clearance of an area of 300 square metres or more of indigenous vegetation (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."* <u>Activity 14(ii)(a)(c)(h)(iv) (GN.R. 324):</u> "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (h) North West*				been included in any Critical Biodiversity Areas										
			Aquatic Ecology	• Potential spread of alien vegetation. • During construction, complete clearing of the PV panel areas, as well any ancillary structures (offices and substations) will be required. This disturbance then allows for the alien species to colonise the soils, if left unmanaged.	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Loss of riparian and or wetland habitat . • During construction, complete clearing of the PV panel areas, as well any ancillary structures (offices and substations) will be required, which may impact the aquatic function or any corridors or connections between aquatic systems. However, these areas can be avoided by the proposed layout.	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Changes to the hydrological regime and increase potential for erosion • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have been included in any Critical Biodiversity Areas	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Changes to surface water quality characteristics	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological

(iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority." Activity 18(h)(v)(ix) (GN.R. 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) North West (v) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (ix) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."*				• During construction or decommissioning, earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. • Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. • This can result in possible deterioration in aquatic ecosystem integrity and species diversity.											Assessment (Appendix E1)
			General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities,		-	S	M	Pr	PR	ML	Yes	- Operators are trained and competent to operate the BESS. Training should include the discussion of the following: - Potential impact of electrolyte spills on groundwater; - Suitable disposal of waste and effluent; - Key measures in the EMPr relevant to worker's activities; - How incidents and suggestions for improvement can be reported.	M	-

				particularly those relying on watercourses (i.e., rivers, streams, etc) as a primary source of water. • Generation of hazardous waste								- 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. - 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.		
			Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	L	S	D	CR	NL	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E8)
		SOCIAL/ECONOMIC ENVIRONMENT	Economic multiplier effects	• Significance of the impact from the economic multiplier effects from the use of local goods and services.		+	P	S	Pr	CR	NL	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E8)
			Improvements on shared infrastructure	• Investment into upgrading and maintain shared infrastructure such as roads and stormwater infrastructure on farms may benefit farming operations	+		P	S	Pr	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
			Potential loss of productive farmland	• The potential loss in productive farmland during the construction phase, due to factors such as the construction of roads, the preparation of foundations, power lines, offices etc.	-		S	S	Pr	BR	ML	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
			Influx of jobseekers and change in population in the study area.	• In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or	-		L	P	Pr	IR	SL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)

				existing services and infrastructure											
			Safety and security impacts	• Temporary increase in safety and security concerns associated with the influx of people during the construction phase	-		L	S	Pr	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
			Daily living and movement patterns	• Temporary increase in traffic disruptions and movement patterns during the construction phase.		-	P	S	Pr	PR	ML	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E8)
			Nuisance impacts (noise and dust)	• Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
			Increased risk of potential veld fires	• The potential loss of livestock, crops, and farmsteads in the area. • This also includes the damage and loss of farm infrastructure and the threatening of human lives that are associated with the increased risk of veld fires	-		L	S	Pr	PR	SL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
			Sense of place	• Intrusion impacts from construction activities will have an impact on the area's "sense of place".	-		L	S	D	PR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
			Visual landscape	• Visual impact of construction activities on sensitive visual receptors in close proximity to the SEF	-		L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact of construction activities on sensitive visual receptors in close proximity to the power line	-		L	S	Po	PR	ML	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E4)
			Traffic volumes	• Increase in development trips for the duration of the construction Phase • Associated noise, dust and exhaust pollution	-		L	M	D	CR	NL	Yes	- See Table 6.3	L	Traffic Impact Assessment (Appendix E9)

			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- N/A	N/A	N/A
			Heritage resources	• As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development.	+		S	S	U	CR	NL	N/A	For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.	L	Heritage Impact Assessment (Appendix E6)
			Paleontological Heritage	• Construction stage Rooidraai Solar. • Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	-		S	P	-	IR	CL	N/A	- N/A	L	Paleontological Impact Assessment (Appendix E7)
			Paleontological Heritage	• Construction stage powerline • Loss of fossil heritage • Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	-		S	P	-	IR	CL	N/A	N/A	L	Paleontological Impact Assessment (Appendix E7)
OPERATIONAL PHASE															
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 12(ii)(a)(c) (GN.R. 327): *"The development of (ii) infrastructure or structures with a physical footprint of 100*	The key components of the proposed project are described below: • PV Panel Array - To produce 150 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays	BIOPHYSICAL ENVIRONMENT	Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- N/A	N/A	N/A
			Geology	• Collapsible soil. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	L	-

square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse." 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(h)(iv) (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 (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."* Activity 14(ii)(a)(c)(h)(iv) (GN.R. 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*	which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the yield. • Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480 V to 33 kV to 132 kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480 V and this is fed into step up transformers to 132 kV. An onsite substation will be required to step the voltage up to 132 kV, after which the power will be evacuated into the national grid. It is expected that generation from the facility will tie in with an existing powerline present within the affected property/ies. The auxiliary infrastructure and the Electricity Grid Infrastructure (EGI) are located in the south-western corner of the facility. A 132kV Loop-In-Loop-Out (LILO) power line from the Eskom switching station will connect into the Hardeklip TR/ Mooirivier RR 1 132kV			• The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.										
			Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.	-		L	L	Po	PR	ML	Yes	- All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater.	L	-
			Aquatic Ecology	• Potential spread of alien vegetation	-		L	L	Pr	IR	NL	Yes	- See Table 6.4	L	Aquatic Ecological Assessment (Appendix E1)
			Employment opportunities and skills development	• The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy.		+	P	L	Pr	BR	NL	Yes	- See Table 6.4	M	Social Impact Assessment (Appendix E8)
		SOCIAL/ECONOMIC	Development of non-polluting, renewable energy infrastructure	• Development of non-polluting, renewable energy infrastructure		+	I	L	D	CR	ML	No	- N/A	M	Social Impact Assessment (Appendix E8)
			Loss of agricultural land and overall productivity	• Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property.	-		S	L	Pr	PR	SL	Yes	- See Table 6.4	L	Social Impact Assessment (Appendix E8)

	Feeder Conductor. The EGI is located within a 100 m wide assessment corridor. • Supporting Infrastructure – The following auxiliary buildings including a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre. The project requires the need for both temporary and permanent laydown areas • Roads – The majority of the access road will follow existing, gravel farm roads that may require widening up to 6 -10 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 of up to 33 km, 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 via the R501 Regional Road and existing farm roads. • Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing		Contribution to LED and social upliftment	• Contribution to LED and social upliftment during the operation of the project		+	I	L	D	PR	NL	Yes	- See Table 6.4	H	Social Impact Assessment (Appendix E8)
			Impact on tourism	• The potential impact on tourism due to the establishment of the Rooidraai SEF.	-		L	L	Pr	CR	NL	Yes	- See Table 6.4	L	Social Impact Assessment (Appendix E8)
			Impact on tourism Sense of place	• The potential impact on tourism due to the establishment of the Rooidraai SEF. • Visual impacts and sense of place impacts associated with the operation phase of Rooidraai.	+ -		L L	L L	Pr Pr	CR CR	NL ML	Yes Yes	- See Table 6.4 - See Table 6.4	L L	Social Impact Assessment (Appendix E8) Social Impact Assessment (Appendix E8)
			Increase in household earnings	• The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increasement in household earnings.		+	P	L	Pr	BR	NL	Yes	- See Table 6.4	M	Social Impact Assessment (Appendix E8)
			Visual landscape	• Visual impact on sensitive visual receptors within a 1km radius from the SEF	-		L	L	Pr	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact on sensitive receptors within a 1km radius from the power line	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact on sensitive visual receptors between a 1km and 3km radius from the SEF	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact on sensitive receptors between a 1km and 3km radius from the power line	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact on sensitive visual receptors within a 3km and 5km radius from the SEF	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)

	with a height of 3.5 meters will be used.		Visual landscape	• Visual impact on sensitive receptors between a 3km and 5km radius from the power line	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact on sensitive visual receptors within a 5-10km radius from the SEF	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impact on sensitive receptors within a 5-10km radius from the power line	-		L	L	Po	PR	NL	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility	-		L	L	Po	CR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impacts of glint and glare as a visual distraction and possible air travel hazard	-		L	L	U	CR	NL	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impacts on sense of place associated with the operational phase of the SEF	-		L	L	Po	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Visual landscape	• Visual impacts and sense of place impacts associated with the operation phase of the PL	-		L	L	Po	CR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E4)
			Traffic volumes	• Slight increase in trips due to permanent staff on site. • Increase in trips around twice a year for transport of water to site for the cleaning of solar panels (water source to be clarified – borehole or transported to site / size of water tankers if water is to be delivered on site).	-		L	S	Pr	CR	NL	Yes	- See Table 6.4	L	Traffic Impact Assessment (Appendix E9)
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- -	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

			Heritage resources	• As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development	+		S	S	U	CR	NL	N/A	For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.	L	Heritage Impact Assessment (Appendix E6)
			Electricity supply	• Generation of additional electricity. The power line will transport generated electricity into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	- -	L	-

			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Aquatic Ecology	• Loss of habitat containing protected species or Species of Special Concern • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones. • Loss can also include a functional loss, through change in vegetation type via alien encroachment, reducing aquatic biodiversity.	-		L	L	Pr	IR	NL	Yes	See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Loss of CBAs or potential areas with conservation potential • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have been included in any Critical Biodiversity Areas	-		L	L	Pr	IR	NL	Yes	See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Loss of riparian and or wetland habitat • During construction, complete clearing of the PV panel areas, as well any ancillary structures (offices and substations) will be required, which may impact the aquatic function or any corridors or	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)

				connections between aquatic systems. However, these areas can be avoided by the proposed layout.											
			Aquatic Ecology	• Changes to the hydrological regime and increase potential for erosion • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have been included in any Critical Biodiversity Areas	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)
			Aquatic Ecology	• Changes to surface water quality characteristics • During construction or decommissioning, earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. • Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota. • This can result in possible deterioration in aquatic ecosystem integrity and species diversity.	-		L	L	Pr	IR	NL	Yes	- See Table 6.3	L	Aquatic Ecological Assessment (Appendix E1)

			Traffic volumes	• Increase in development trips for the duration of the construction Phase • Associated noise, dust and exhaust pollution	-		L	M	D	CR	NL	Yes	- See Table 6.3	L	Traffic Impact Assessment (Appendix E9)
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	- N/A	N/A	N/A
			Heritage resources	• As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development	+		S	S	U	CR	NL	N/A	- For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.	L	Heritage Impact Assessment (Appendix E6)
				•											
				•											

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

Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;	(CL) Complete Loss
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	-

6.2 KEY ISSUES IDENTIFIED

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

6.2.1 Impacts During the Construction Phase

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 12(ii)(a)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."*
- Activity 19 (GN.R. 327): *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."*
- Activity 24(ii) (GN.R. 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 28(ii) (GN.R. 327): "*Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56(ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R. 325): *" The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more"*
- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*
- Activity 4(h)(iv) (GN.R. 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (h) North West province, (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*
- Activity 10(h)(iv) (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 (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."

- Activity 12(h)(iv)(vi) (GN.R. 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (vi) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland."*
- Activity 14(ii)(a)(c)(h)(iv) (GN.R. 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*
- Activity 18(h)(v)(ix) (GN.R. 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) North West (v) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority (ix) 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 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifauna Impact Assessment (Appendix E3)	Displacement of priority avian species from important habitats (PV array and associated infrastructure)	Negative High	Negative Medium	• It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. • It is unlikely that the significance of the impact will change should the "preferred" access road be constructed. Both the PV facility and the "preferred" access road option contain the same habitat types of medium sensitivity (~1.6km corresponds to natural grassland and bush clump habitat). However, access road option 2 is shorter (~2.8km) compared to the "preferred" option (~4.2km) and the entire route corresponds to an existing road, which will lower the impact (when compared to the construction of the "preferred access road). • The best practicable mitigation will be to consolidate infrastructure to areas where existing impacts occur and to relocate (remove) any artificial watering holes. • All road networks must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.

	Displacement of resident avifauna through increased disturbance (PV array and associated infrastructure)	Negative Medium	Negative Medium	• It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. • It is unlikely that the significance of the impact will change should the "preferred" access road be constructed. Both the PV facility and the "preferred" access road option contain the same habitat types of medium sensitivity (~1.6km corresponds to natural grassland and bush clump habitat). However, access road option 2 is shorter (~2.8km) compared to the "preferred" option (~4.2km) and the entire route corresponds to an existing road, which will lower the impact (when compared to the construction of the "preferred access road). • The best practicable mitigation will be to consolidate infrastructure to areas where existing impacts occur and to relocate (remove) any artificial watering holes. • All road networks must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.
	Loss of important avian habitats (PV array and associated infrastructure)	Negative Medium	Negative Medium	• It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. • It is unlikely that the significance of the impact will change should the "preferred" access road be constructed. Both the PV facility and the "preferred" access road option contain the same habitat types of medium sensitivity (~1.6km corresponds to natural grassland and bush clump habitat). However, access road option 2 is shorter (~2.8km)

				compared to the "preferred" option (~4.2km) and the entire route corresponds to an existing road, which will lower the impact (when compared to the construction of the "preferred access road). • The best practicable mitigation will be to consolidate infrastructure to areas where existing impacts occur and to relocate (remove) any artificial watering holes. • All road networks must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.
	Displacement of priority avian species from important habitats (Power Line	Negative Medium	Negative Low	• It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. The grid connection infrastructure occurs predominantly on habitat types of medium sensitivity. The best practicable mitigation will be to consolidate infrastructure (e.g., proposed powerline) to areas where existing impacts occur (e.g., placing the proposed powerline alongside existing powerlines and or road infrastructure). • Avoid livestock watering points, or remove/relocate watering points. • All access roads must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.
	Displacement of resident avifauna through increased disturbance (Power Line)	Negative Medium	Negative Low	• It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. The grid connection infrastructure occurs predominantly on habitat types of medium sensitivity. The best practicable mitigation will be to consolidate infrastructure (e.g.,

				proposed powerline) to areas where existing impacts occur (e.g., placing the proposed powerline alongside existing powerlines and or road infrastructure). • Avoid livestock watering points, or remove/relocate watering points. • All access roads must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.
	Loss of important avian habitats (Power Line)	Negative Medium	Negative Low	• It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. The grid connection infrastructure occurs predominantly on habitat types of medium sensitivity. The best practicable mitigation will be to consolidate infrastructure (e.g., proposed powerline) to areas where existing impacts occur (e.g., placing the proposed powerline alongside existing powerlines and or road infrastructure). • Avoid livestock watering points, or remove/relocate watering points. • All access roads must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.
Terrestrial Biodiversity Assessment (Appendix E2)	Potential impacts on plant biodiversity and habitats	Negative Medium	Negative Low	• Preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated. • Since a large proportion of the identified protected species at the site are geophytic (e.g. Babiana hypogea, Schizocarphus nervosus), the potential for successful translocation is high. Before construction commences individuals of listed species within the development

				footprint that would be affected, should be counted and marked and translocated where deemed necessary by the ecologist conducting the pre-construction walk-through survey, and according to the recommended ratios. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species. • Any individuals of protected species affected by and observed within the development footprint during construction should be translocated under the supervision of the ECO and/or Contractor's Environmental Officer (EO). • Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc. • Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna. • ECO and/or Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place. • Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible. • All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed.

				• Regular dust suppression during construction, if deemed necessary, especially along access roads. • No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO. • No fires should be allowed on-site.
	Impact on Faunal Diversity.	Negative Low	Negative Low	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. • The collection, hunting, or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. • Fires should not be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel, and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All construction vehicles should adhere to a low speed limit (30 km/h) to avoid collisions with susceptible species such as snakes and tortoises. • Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).
	Impact on Critical Biodiversity Areas and	Negative Medium	Negative Medium	• The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.

	broad-scale ecological processes.			• An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland. • Reduce the footprint of the facility within sensitive habitat types as much as possible. • All disturbed areas that are not used, such as excess road widths, should be rehabilitated with locally occurring plant species after construction to reduce the overall footprint of the development.
Aquatic Ecological Assessment (Appendix E1)	Loss of habitat containing protected species or Species of Special Concern	Negative Medium	Negative Low	Mitigation measures to reduce residual risk or enhance opportunities: • A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. • Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any

				unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.

				• All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
	Loss of CBAs or potential areas with conservation potential	Negative Medium	Negative Low	Mitigation measures to reduce residual risk or enhance opportunities: • The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. If High / No-Go are avoided by the major infrastructure, then aquatic zones associated with the development can be avoided, noting that at Present the Gauteng Province does not have any spatial data on Aquatic CBAs • A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. • Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).

				To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks to cross wetlands rather than constructing entirely new roads wherever possible. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow

				patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
	Potential spread of alien vegetation	Negative Medium	Negative Low	Mitigation measures to reduce residual risk or enhance opportunities: • Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility • The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications • Regeneration of alien vegetation must be monitored once all areas have been cleared, forming part of a long-term alien vegetation management plan.
	Loss of riparian and or wetland habitat	Negative Medium	Negative Low	Mitigation measures to reduce residual risk or enhance opportunities: • A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the

				stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. • Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks to cross wetlands rather than constructing entirely new roads wherever possible. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.

				• The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
	Changes to the hydrological regime and increase potential for erosion	Negative Medium	Negative Low	Mitigation measures to reduce residual risk or enhance opportunities: • No stormwater discharged may be directed to delineated aquatic zones or the associated buffers.

				• A stormwater management plan must be developed post EA, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. • Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas To minimise the impact of the access roads: • Use existing roads or upgrade existing tracks to cross wetlands rather than constructing entirely new roads wherever possible. • Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences. • Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils. • All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. • The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from

				being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. • Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. • Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. • All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. • It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
	Changes to surface water quality characteristics	Negative Medium	Negative Low	Mitigation measures to reduce residual risk or enhance opportunities: • All liquid chemicals including fuels and oil, including for the BESS, must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected

				routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. • Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). • Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. • All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 50 m from any demarcated water courses. • Littering and contamination associated with construction activity must be avoided through effective construction camp management. • No stockpiling should take place within or near a water course. • All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable. • ESO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified.
Visual Impact Assessment (Appendix E4)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SEF	Negative Low	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.
	Visual impact of construction activities on sensitive visual receptors in close proximity to the PL.	Negative Low	Negative Low	

				• Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Social Impact Assessment (Appendix E8)	The creation of direct and indirect employment opportunities during the construction phase of the project.	Low Positive	Medium Positive	Enhancement: • A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater JB Marks LM, Dr Kenneth Kaunda DM, North West Province, South Africa, or elsewhere. • Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. • As with the labour force, suppliers should also as far as possible be sourced locally. • As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

	Significance of the impact from the economic multiplier effects from the use of local goods and services.	Low Positive	Medium Positive	Enhancement: • It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. • Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
	Investment into upgrading and maintain shared infrastructure such as roads and stormwater infrastructure on farms may benefit farming operations	Low Positive	Low Positive	Enhancement: • The project would contribute to an upgrade in the shared infrastructure of the LM as well as in the maintenance of this infrastructure. • The LM would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created (or sourced from the local Municipality, where available) and companies listed thereon should be invited to bid for project-related work where applicable and this would include the maintenance of this shared infrastructure.

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

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

				• The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. • The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	Temporary increase in traffic disruptions and movement patterns during the construction phase.	Negative Medium	Negative Medium	• All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. • Heavy vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the N14 road users to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work). • The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.

				• The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site	Negative Medium	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	The potential loss of livestock, crops, and farmsteads in the area. This also includes the damage and loss of farm infrastructure and the threatening of human lives	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment.

	that are associated with the increased risk of veld fires			• No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas. • Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • Fire risks must be managed in terms of a fire management plan and in compliance with the National Veld and Forest Fire Act.
	Intrusion impacts from construction activities will have an impact on the area's "sense of place".	Negative Medium	Negative Low	• Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. • Communication, complaints, and grievance channels must be implemented, and contact details of the CLO must be provided to the local community in the study area.

Traffic Impact Assessment (Appendix E9)	Increase in development trips for the duration of the construction Phase Associated noise, dust and exhaust pollution	Negative Medium	Negative Low	• Stagger component delivery to site. • Reduce the construction period. • Stagger the construction Phase. • The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network • Staff and general trips should occur outside of peak traffic periods as much as possible. • Maintenance of haulage routes. • Design and maintenance of internal roads to reduce the risk of congestion.

6.2.2 Impacts During the Operational Phase

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*

- Activity 12(ii)(a)(c) (GN.R. 327):
- *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."*

- 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(h)(iv) (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 (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*

- Activity 14(ii)(a)(c)(h)(iv) (GN.R. 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (h) North West (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority."*

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

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifauna Impact Assessment (Appendix E3)	The creation of novel or new avian habitat for commensal bird species or superior competitive species.	Negative Low	Negative Low	• Apply bird deterrent devices and remove nest structures constructed on infrastructure associated with the PV facility under the guidance of the ECO.
	Collisions with PV panels leading to injury or loss of avian life	Negative Medium	Negative Medium	• Apply bird deterrent devices such as rotating flashers/reflectors to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels. Security/CCTV cameras may be installed to quantify mortalities (cameras are also installed along the perimeter fence for security measures and may also prove effective to quantify mortalities). • Buffer artificial livestock watering points (by at least 100m), or remove/relocate watering points. • Implement additional pre-construction monitoring to evaluate important bird flyways/dispersal routes. • Implement post-construction monitoring. If post-construction monitoring predicts and/or confirms any bird mortalities, an option is to employ video cameras at selected areas to document bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis.
	Collision when flying into power line infrastructure	Negative High (especially due to	Negative Medium	• Apply bird deterrent devices to the power lines and make use of "bird-friendly" pylon structures.

	(mainly applicable to foraging vultures)	potential occurrence of vultures)		• All cattle feedlots and watering points within close proximity of power lines should be relocated (at least 100m from the power line servitude) where relevant. • Grazing of cattle in close proximity to overhead power lines should be avoided (to minimize potential occurrences of livestock carcasses near power line servitudes). • To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to conduct direct observations and carcass searches on a regular and systematic basis. As a priority, the entire length of the powerline should be marked with bird diverters. In addition, the impact significance (after mitigation) could be reduced if the proposed.
	Electrocution when perched on power line infrastructure (mainly applicable to foraging vultures)	Negative High (especially due to potential occurrence of vultures)	Negative Medium	• Electrocution will be proportional to the spatial position of livestock carcasses (with reference to scavenging birds of prey), and will probably only occur when a carcass is located underneath or in close proximity to an overhead distribution power line. • Apply bird deterrent devices to the power line. • Avoid the placement of cattle feedlots and watering points near electrical infrastructure. All cattle feedlots and watering points within close proximity of power lines should be relocated (at least 100m from the power line servitude) – if relevant. • Grazing of cattle at or in close proximity to distribution lines should be monitored at all times and preferably be avoided (to minimise potential livestock carcasses near power line servitudes).

				• Make use of bird-friendly pylons and bird guards as recommended by EWT. Position of electrical infrastructure in close proximity to existing infrastructure will minimize the risk of electrocutions.
Terrestrial Biodiversity Assessment (Appendix E2)	Soil erosion and associated degradation of ecosystems.	Negative Low	Negative Low	• Any erosion problems observed along access roads or any hardened/engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • All bare areas (excluding agricultural land and the development footprint), affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. • Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible • Roads and other disturbed areas should be regularly monitored for erosion problems, and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation. • Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas. • Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.
	Alien Plant Invasion.	Negative Low	Negative Low	• The successful reduction in the treat (significance) posed by Alien Invasive Plants relies on a detailed;

				○ Site-specific eradication and management programme for alien invasive plants; ○ Site-specific Vegetation Rehabilitation Management Plan; and ○ The meticulous implementation of this Management Plan. • Such an Alien Invasive and Vegetation Rehabilitation Management Plan must subsequently be included in the Environmental Management Programme (EMPr). • Regular monitoring by the operation and maintenance team for alien plants must occur and could be conducted simultaneously with erosion monitoring. • When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. • Clearing methods must aim to keep disturbance to a minimum. • No planting or importing any listed invasive alien plant species (all Category 1a, 1b, 2, and 3 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.
Aquatic Ecological Assessment (Appendix E1)	Potential spread of alien vegetation	Negative Medium	Negative Low	• Refer to Construction Phase mitigation (Table 6.3)

Visual Impact Assessment (Appendix E4)	Visual impact on sensitive visual receptors within a 1km radius from the SEF	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient and not posing an immediate fire hazard. Operations: • Maintain general appearance of the facility as a whole.
	Visual impact on sensitive receptors within a 1km radius from the power line	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Operations: • Maintain general appearance of the power line corridor. • Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source.
	Visual impact on sensitive visual receptors between a 1km and 3km radius from the SEF.	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient and not posing an immediate fire hazard. Operations:

				• Maintain general appearance of the facility as a whole.
	Visual impact on sensitive receptors between a 1km and 3km radius from the power line.	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Operations: • Maintain general appearance of the power line corridor. • Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source.
	Visual impact on sensitive visual receptors within a 3km and 5km radius from the SEF	Negative Medium	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient and not posing an immediate fire hazard. Operations: • Maintain general appearance of the facility as a whole.
	Visual impact on sensitive receptors between a 3km and 5km radius from the power line.	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Operations: • Maintain general appearance of the power line corridor.

				• Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source.
	Visual impact on sensitive visual receptors within a 5-10km radius from the SEF	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient and not posing an immediate fire hazard. Operations: • Maintain general appearance of the facility as a whole.
	Visual impact on sensitive receptors within a 5-10km radius from the power line	Negative Low	Negative Low	Planning: • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Operations: • Maintain general appearance of the power line corridor. • Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source.
	Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility	Negative Low	Negative Low	Planning & Operation As far as practically possible: • Shield the source of light by physical barriers (walls, vegetation etc.) • Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights.

				• Make use of minimum lumen or wattage in fixtures. • Make use of down-lighters, or shield fixtures. • Make use of low-pressure sodium lighting or other types of low impact lighting. • Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. • The use of night vision or thermal security cameras are very effective and can replace security lighting entirely.
	Visual impacts of glint and glare as a visual distraction and possible air travel hazard	Negative Low	Negative Low	• No mitigation measures are required.
	Visual impacts on sense of place associated with the operational phase of the SEF	Negative Low	Negative Low	• It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity. • The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may

				enlist a sense of pride in the renewable energy project in their area. • Implement good housekeeping measures.
	Visual impacts and sense of place impacts associated with the operation phase of the PL.	Negative Low	Negative Low	• It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity. • The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area. • Implement good housekeeping measures.
Social Impact Assessment (Appendix E8)	The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy	Positive Low	Positive Medium	Enhancement: • It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

				• Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• None identified
	Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property	Negative Medium	Negative Low	• The proposed mitigation measures for the construction phase should have been implemented at this stage.
	Contribution to LED and social upliftment during the operation of the project	Positive Medium	Positive High	Enhancement: • A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. • Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. • The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).
	The potential impact on tourism due to the	Positive/Negative Low	Positive/Negative Low	• Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels entirely, but the subjectivity towards the PV panels can be influenced by creating a “Green Energy” awareness

	establishment of the Rooidraai SEF			campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability.
	Visual impacts and sense of place impacts associated with the operation phase of Rooidraai SEF	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the development of the Rooidraai SEF, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.
	The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increasement in household earnings	Positive Low	Positive Medium	Enhancement: • It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • With the recruitment of the local community for job creation and increasement in household earnings will automatically be seen in the area surrounding the development.
Traffic Impact Assessment (Appendix E9)	Slight increase in trips due to permanent staff on site. Increase in trips around twice a year for transport of water to site for the cleaning of solar panels (water source	Negative Low	Negative Low	• Source on-site water supply if possible. • Utilise cleaning systems for the panels needing less vehicle trips. • Schedule trips for the provision of water for the cleaning of panels outside peak traffic times as much as possible.

	to be clarified – borehole or transported to site/size of water tankers if water is to be delivered on site)			

6.2.3 Impacts During the Decommissioning Phase

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

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifauna Impact Assessment (Appendix E3)	Displacement of priority avian species from important habitats	Negative Low	Negative Low	• Avoid the temporary storage (laydown) of removed infrastructure on habitat with a high avian sensitivity. • Rehabilitation should make use of indigenous floristic species that are native to the study area.
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	• Avoid the temporary storage (laydown) of removed infrastructure on habitat with a high avian sensitivity. • Rehabilitation should make use of indigenous floristic species that are native to the study area.
Terrestrial Biodiversity Assessment (Appendix E2)	Direct Faunal Impacts.	Negative Low	Negative Low	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. • Fires should not be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel,

				and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. • Vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint).
	Soil erosion and associated degradation of ecosystems.	Negative Low	Negative Low	• Any erosion problems observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. • All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. • Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible.
	Alien Plant Invasion.	Negative Low	Negative Low	• The successful reduction in the threat (significance) posed by Alien Invasive Plants relies on a detailed; o Site-specific eradication and management programme for alien invasive plants;

				○ Site-specific Vegetation Rehabilitation Management Plan; and ○ The meticulous implementation of this Management Plan. • Such an Alien Invasive and Vegetation Rehabilitation Management Plans must subsequently be included in the Environmental Management Programme (EMPr). • Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control must be implemented until a cover of indigenous species (ideally climax species) has returned. • When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. • Clearing methods must aim to keep disturbance to a minimum. • No planting or importing of any listed invasive alien plant species (all Category 1a, 1b, 2, and 3 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.
Aquatic Ecological Assessment (Appendix E1)	Loss of habitat containing protected species or Species of Special Concern	Negative Medium	Negative Low	• Refer to construction mitigation measures (Table 6.3)

	Loss of CBAs or potential areas with conservation potential	Negative Medium	Negative Low	• Refer to construction mitigation measures (Table 6.3)
	Loss of riparian and or wetland habitat	Negative Medium	Negative Low	• Refer to construction mitigation measures (Table 6.3)
	Changes to the hydrological regime and increase potential for erosion	Negative Medium	Negative Low	• Refer to construction mitigation measures (Table 6.3)
	Changes to surface water quality characteristics	Negative Medium	Negative Low	• Refer to construction mitigation measures (Table 6.3)
Traffic Impact Assessment (Appendix E9)	Increase in development trips for the duration of the construction Phase Associated noise, dust and exhaust pollution	Negative Medium	Negative Low	• Refer to construction mitigation measures (Table 6.3) • It is noted that it is unlikely that all developments will be constructed at the same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the respective projects.

6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- Aquatic Ecological Assessment – EnviroSci (Pty) Ltd (see Appendix E1)
- Terrestrial Biodiversity Assessment, Animal Species Compliance Statement, and Plant Species Compliance Statement – David Hoare Consulting (Pty) Ltd (see Appendix E2)
- Avifaunal Scoping Report– Pachnoda Consulting CC (see Appendix E3)
- Visual Impact Assessment – Donaway Environmental Consultants (see Appendix E4)
- Agricultural Compliance Statement – Johann Lanz Soil Scientist (see Appendix E5)
- Heritage Impact Assessment – J van Schalkwyk (see Appendix E6)
- Palaeontological Impact Assessment – Banzai Environmental (Pty) Ltd (see Appendix E7)
- Social Impact Assessment – Donaway Environmental Consultants (see Appendix E8)
- Traffic Impact Assessment – iWink Consulting (Pty) Ltd (see Appendix E9)
- Desktop Geotechnical Assessment – Delta Geotech (see Appendix E10)
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics, in conjunction with the project specialists (refer to Section 7 of this report).

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

6.3.1 Aquatic Ecological/Wetland 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 Aquatic Ecological Assessment (Appendix E1), three major types of natural aquatic features were identified on site:

- Watercourses with Channelled Valley Bottom Wetlands;
- Drainage lines; and
- Artificial voids / dams

Most of the anticipated impacts would include disturbance during the construction phase, while changes to form and function of the site due to increased runoff roads or hard surfaces that would occur in the operational and maintenance (O&M) phase. Based then on this assumption the following impacts were assessed.

- Impact 1: Loss of habitat containing protected species or Species of Special Concern

- Impact 2: Loss of any critical corridors and connect habitats that are linked to any future conservation plans or protected areas expansion associated within any riverine or wetland systems
- Impact 3: The potential spread of alien vegetation
- Impact 4: Loss of riparian and or wetland habitat
- Impact 5: Changes to the hydrological regime and increased potential for erosion
- Impact 6: Changes to water quality
- Impact 7: Cumulative Impacts

The Aquatic Ecological Assessment (Appendix E1) confirmed that the impacts upon aquatic biodiversity associated with the project are of Low significance, after mitigation. The loss of irreplaceable aquatic habitat and/or important biota is highly unlikely. The impacts are considered to be easily mitigated (provided the mitigation measures and monitoring plan within the EMP and this report are implemented and adhered to during all phases of the project).

The specialist has no objection to the authorisation of the proposed activities assuming that all mitigations and buffer zones are implemented or only transformed areas are utilised as is the case for this project. This also applies to any of the alternative access roads, as none will have a direct impact on any important or sensitive aquatic systems, thus there is no preference from an aquatic standpoint. Mitigation should focus on these areas and include measures to halt erosion and rehabilitate habitat in the sections affected by the construction. Without the implementation of mitigation measures, the project has potential to cause a Moderate cumulative impact upon aquatic biodiversity. However, with the adoption of mitigation, the proposed project will have a Low impact upon aquatic biodiversity.

6.3.2 Ecological Impacts

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

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

According to the Terrestrial Biodiversity Assessment (Appendix E2), the most significant potential impacts expected to occur within the development area of the proposed Rooidraai PV Solar Energy Facility are:

- Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without the vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- Disturbed vegetation in the study area carries a high risk of invasion by alien invasive plants, which may or may not be present in the study area or nearby. The control and continuous monitoring and eradication of alien invasive plants will form and integral

part of the environmental management of the facility from construction up to decommissioning.

The bulk of project site is located within natural, primary, climax grassland. This grassland is a good representation of Carletonville Dolomite Grassland vegetation type, which is listed as Least Threatened. The entire project site is located within a NPAES Priorities Focus Area (FA). The project site is not located within a Threatened Ecosystem with the affected ecosystem, Carletonville Dolomite Grassland vegetation type, regarded as Least Threatened. In terms of terrestrial CBAs the entire project site has been classified as an ESA 1 (T7: Corridor) and CBA2 (T9: Corridor Node). No high sensitive features and "No-Go" areas were identified within the project area with the bulk of the project site located within a Medium Ecological Important and Sensitive area whilst the remainder of the project has been classified as Low in terms of Ecological Importance and Sensitivity.

Overall, no significant terrestrial ecological flaws that could pose a problem to the proposed PV Facility development were identified during the EIA phase assessment. The specialist stated that he has no objections to the development of the Rooidraai PV Solar Energy Facility (from a terrestrial ecological perspective), and as such the aforementioned project may be approved by the competent authority.

6.3.3 Avifaunal Impacts

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

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

According to the Avifaunal Impact Assessment (Appendix E2), two avifaunal habitat types were identified on the study site and surroundings, consisting of open grassland with bush clump mosaics and artificial livestock watering points. Approximately 132 bird species were expected to occur in the wider study area, of which 71 species were observed in the study area (during two independent surveys). The expected richness included seven threatened or near threatened bird species, 12 southern African endemics and 12 near-endemic species. However, the occurrence of threatened and near threatened bird species was predicted to be low, although the natural broad-scale habitat units provided foraging habitat for the occasional occurrence of the vulnerable lanner falcon (Falco biarmicus), while the endangered Cape vulture (Gyps coprotheres) was confirmed during the surveys, mainly as roosting individuals and birds soaring overhead. Nine southern African endemics and 10 near-endemic species were confirmed on the study site.

The main impacts associated with the proposed PV solar facility included the following:

- The loss of habitat and subsequent displacement of bird species due to the ecological footprint required during construction.
- Direct interaction (collision trauma) by birds with the surface infrastructure (photovoltaic panels) caused by polarised light pollution and/or colliding with the panels (as they are mistaken for waterbodies).
- Collision with associated infrastructure (mainly overhead power lines).

An evaluation of potential and likely impacts on the avifauna revealed that the impact significance was moderate to low after mitigation (depending on the type of impact). However, the risk for certain waterbirds (mainly large-bodied waterfowl such as the South African Shelduck Tadorna cana and Egyptian Goose Alopochen aegyptiacus) colliding with the PV infrastructure remained eminent. Post-construction monitoring was recommended along with the installation of appropriate bird diverters to minimise the potential risk of collision trauma in passing birds. In addition, the endangered Cape Vulture (Gyps coprotheres) was identified as a regular foraging visitor to the study area (according to SABAP2 reporting rates and on-site observations). This species is prone to power line collisions, and any new or existing overhead power line corridor could pose a collision and electrocution risk to vultures. The risk of collision/electrocution was considered likely when vultures feed on a carcass in close proximity to a power line servitude or when attempting to roost on the pylon structures.

No fatal-flaws were identified during the assessment, although it was strongly recommended that the proposed mitigation measures and monitoring protocols (e.g. Post construction monitoring) be implemented during the construction and operational phase of the project.

6.3.4 Visual Impacts

Due to the extent of the proposed PV facility, it is expected that the facility 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 will the landscape provide any significant visual absorption capacity*"

According to the Visual Impact Assessment (Appendix E4), the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners, the Boskop Rysmierbult settlement and the Rysmierbult Witpoort tar road. However, a large part of the visual landscape is still reflecting a farming landscape and intensive mining landscape, beyond the 10km radius, with a much lower visual quality.

The construction and operational phase of the proposed Rooidraai Solar SEF and its associated infrastructure, will have a visual impact on the study area, especially within (but not restricted to) a 1km radius of the proposed SEF. The visual impact will differ amongst places, depending on the distance to the SEF. Receptors that might be the most sensitive to the proposed development are residents living and working on nearby farms, the Boskop Rysmierbult settlement and the Rysmierbult Witpoort tar road. Referring to Table 8.1 to Table 8.3, the proposed SEF development might have a negative low impact after mitigation. The ZTV model also reflects a low average theoretical visibility of approximately 36%. The area closer to Carletonville is visually polluted by mining activities and residents of the area might already be desensitised to industrial or service developments, but the area around the proposed development has a better visual quality related to farming. The tourism sector in the area is very small due to little tourist attractions. The development of the SEF in this area will concentrate a negative visual impact in an almost visually polluted landscape.

The construction and operational phase of the power line will have a visual impact on the study area, especially within (but not restricted to) a 1km radius. The visual impact will differ amongst places, depending on the distance to the PL. Receptors that might be the most

sensitive to the proposed development are residents living and working on nearby farms. The ZTV model also reflects a low average theoretical visibility of approximately 56%.

Due to the extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the PV facility entirely, but the possible visual impacts can be reduced. Several mitigation measures have however been proposed regardless of whether mitigation measures will reduce the significance of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the project, if possible. In terms of possible landscape degradation, the landscape does not appear to have any specific protection and is characterised by farming and mining development. No buffer areas or areas to be avoided are applicable for this development.

It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic characteristics are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; It is mostly perceived as symbols of energy independence, and local prosperity. The visual impact is also dependant on the land use of an area and the sensitivity thereof in terms of visual impact, such as protected areas, parks and other tourism related activities.

Considering all positive factors of such a development including economic factors, social factors and sustainability factors, especially in a semi-arid country, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. It is therefore the specialist's recommendation that the project be approved.

6.3.5 Agricultural / impacts on the soil

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

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

According to the Site Sensitivity Verification and Agricultural Compliance Statement (Appendix E5), the land capability of this site is assessed as being insufficient for viable and sustainable crop production due to soil depth limitations. The entire site is therefore verified in this assessment as being of medium agricultural sensitivity.

Two potential mechanisms of negative agricultural impact were identified, occupation of agricultural land and soil degradation. Two potential mechanisms of positive agricultural impact were identified as increased financial security for farming operations and improved security against stock theft and other crime.

All mechanisms are likely to lead to low impact on the agricultural production potential and the agricultural impact is therefore assessed as having low significance. The conclusion of this assessment is that the agricultural impact of the proposed development is acceptable because:

- It will occupy land that is of insufficient land capability for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.
- The amount of agricultural land use by the development is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with low agricultural production potential.
- The PV panels will not necessarily totally exclude agricultural production. The area may still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facility.
- All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country.

From an agricultural impact point of view, it is recommended that the development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.

6.3.6 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 sites. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

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

The Heritage Impact Assessment (Appendix E6) describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The investigation consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey that also included the interviewing of relevant people. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a very limited pre-colonial Stone Age and Iron Age occupation. The second and much later component is a colonial farmer one, with a very limited urban component consisting of a number of smaller towns, most of which developed during the last 120 to 150 years.

From a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Rooidraai Solar Site is in an area with a low presence of heritage sites and features.

- Less frequently found are artefacts dating to the Stone Age. Those that have been reported on mostly date to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance.
- There is also a limited Late Iron Age element. Stone walled sites are scattered all over, especially on the higher, more rocky areas to the south.
- The historic period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For this review, heritage sites located in urban areas have been excluded.

Identified sites

During the survey no sites, features or objects of cultural significance were identified. During the site visit, the high and dense vegetation that covered the project area limited ground visibility very much.

From a heritage point of view, it is recommended that the proposed project be allowed to continue on acceptance of the conditions proposed below:

- The Palaeontological Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo) indicate that the project area has a very high sensitivity of fossil remains to be found and therefore a palaeontological assessment and protocol for finds would be required.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

6.3.7 Paleontological Impacts

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

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

According to the Palaeontological Impact Assessment (Appendix E7), the Carmel Solar 3 development is underlain by the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup), the Rooihoogte and Timeball Hill Formations (Pretoria Group, Transvaal Supergroup) as well as unfossiliferous diabase. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Malmani Subgroup is Very High, that of the Timeball Hill Formation is High, while the

Rooihoogte has a Low Palaeontological Sensitivity. The Palaeontological Sensitivity of the diabase is Zero as it is igneous in origin (Almond et al, 2013; SAHRIS website). The Very High Sensitivity of the Malmani Subgroup triggered a site investigation.

The Rooidraai Solar development is underlain by the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Malmani Subgroup is Very High (Almond *et al*, 2013; SAHRIS website). The Very High Palaeontological Sensitivity of the development triggered a site investigation.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the weekend of the 3 November 2022. Outcrops of weathered to fairly well-preserved stromatolites were discovered on the development. Mitigation of a sample of well-preserved stromatolites is thus recommended. By implementing mitigation measures the significance of the impact will be reduced to Low. Mitigation should take place after initial vegetation is cleared away but *before* the ground is levelled for construction. These recommendations should be included in the Environmental Management Plan of the Rooidraai Solar Power Plant.

Recommendations:

- The ECO must be made aware that fossils (stromatolites) of the Malmani (Chuniespoort Group, Transvaal Supergroup) has a High to Very High Palaeontological Sensitivity.
- If a well-preserved stromatolite outcrop s is uncovered in the development footprint (after vegetation clearance) the stromatolites may be cordoned off and a buffer of 30m may be placed around the outcrop or a reprehensive example should be removed and placed near the offices of the PV as an informative example of fossils in the area.

It is therefore considered that the proposed Rooidraai Solar Photovoltaic Solar Energy Facility, will not lead to detrimental impacts on the palaeontological reserves of the area if mitigation measures are adhered to. As such the construction of the development may be authorised in its whole extent.

6.3.8 Socio-Economic Impacts

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

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

According to the Social Impact Assessment (Appendix E8), there are some vulnerable communities within the project area that may be affected by the development of Rooidraai SEF and its associated infrastructure. These communities include the people living in the town of Carletonville or close rural developments next to the proposed project. Traditionally, the construction phase of a SEF development is associated with most social impacts. Many of the

social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

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

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of SEF projects (these relate to an influx of non-local workforce and jobseekers, intrusion, and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks) and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.
- It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

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

- The appointment of a CLO to assist with the management of social impacts and to deal with community issues, if feasible.
- It is imperative that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction activities. where possible. Local procurement of labour and services/products would greatly benefit the community during the construction and operational phases of the project.
- Local procurement of services and equipment is required where possible in order to enhance the multiplier effect.

- Involve the community in the process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning/construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.
- The local fire association should be joined as a third-party insurance to cover any possible fire damages caused by the project. The project will only be covered if all necessary fire prevention requirements and laws are adhered to. Details of the local fire association can be obtained from the local farmers union.

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

6.3.9 Traffic Impacts

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

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

According to the Traffic Impact Assessment (Appendix E9), the potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Rooidraai Photovoltaic Solar Energy Facility were identified and assessed.

The highest trip generator for the project is expected during the construction phase. The actual construction stage peak hour trips are dependent on the construction period, construction programming, material availability, component delivery, abnormal load permitting etc. The decommissioning phase is expected to generate similar trips as the construction phase. The traffic impact during the operational phase is considered negligible.

For the construction, operational and decommissioning phases, the impact expected to be generated by the vehicle trips is an increase in traffic and the associated noise, dust, and exhaust pollution. Based on the high-level screening of impacts and mitigation, the project is expected to have a negative low impact during the construction and decommissioning stages.

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

6.3.10 Geotechnical Desktop Study

Geotechnical suitability the geotechnical suitability of the site for the proposed development needed to be determined. The main question which needs to be addressed is:

"Are the geotechnical conditions favourable for the development of a PV facility?"

According to the Desktop Geotechnical study (Appendix E10), the recommendations are based solely on the perceived site conditions and a detailed geotechnical investigation will be required to confirm site conditions. This will be done prior to construction related activities.

Subgrade and Foundations

Though confirmation will be required through detailed investigations, it is anticipated that the granular transported soils will be loose from surface to approximately 0.20m begl and rapidly become medium dense to dense. Pedogenic soils would be dense to very dense in consistency if encountered. While the residual soils if encountered could have a fine-grained component that may exhibit compressibility, heave potential and require some form of ground improvement.

In terms of founding, expect moderate founding depths in denser soils or rock for all structures. Pad footings or shallow screw piles may be options.

Depending on the thickness of the transported sands and the expansiveness of possible residual soils, additional precautions such ground improvement in the form of soil mattresses may be required.

Detailed geotechnical and dolomite stability investigations will be required for the the Rooidraai Solar site as it overlies the Malmani Subgroup formations. Dolomite investigations specifically can be exceptionally costly as they require core and percussion drilling, geophysical investigations, and specialized testing with interpretation.

Excavatability

Excavation in soils would classify as "Soft" and possibly "Boulder Class B" in places, excavation in terms of the SANS 1200DM Earthworks Specification. Whilst excavation in the highly weathered medium hard rock would classify as "Intermediate" excavation. Any moderately to unweathered hard rock would classify as "Hard Rock" excavation and may require the use of tracked excavators with rock buckets and pneumatic hammers, as well as controlled blasting (Diabase, unweathered dolomite etc).

Possible Geotechnical Restraints to be Overcome

The following restraints could potentially occur:

- Compressible soils associated with deeper aeolian and colluvial soils.
- Saturated soils during peak rainfall episodes may result in difficulties associated with access around the site.
- Moderately expansive or compressible soils associated with thicker wad residual soils.
- Potential sporadic boulder class A and B excavation requirements associated with differential weathering in the dolomites and possibly alluvial soils if encountered.

- Intermediate and Hard rock excavation likely to occur at shallow to moderate of between 0.50m to 2.00m depths.
- Dolomitic doline and sinkhole formation.

These restraints can be overcome through allowance of effective construction procedures and equipment as well as effective engineering designs informed from actual geotechnical parameters obtained in the field. The Rooidraai Solar Site is potentially high risk and will require a full Dolomite Risk Assessment and Investigation to determine the potential for sinkhole formation and provide an integrated dolomite risk management strategy.

In summary, detailed geotechnical assessment is required to confirm site geology and groundwater regime. If the sites are classified as low risk from these studies, then standard foundation solutions will be appropriate. If sinkhole and doline formation is determined to be high risk then costly techniques such as ground improvement using soil mattresses, piles etc may be required.

6.3.11 Risk Assessment for Battery Storage System

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

As with any fire or explosion, a potential consequence of Li-ion battery fires is the endangerment of life and property. These consequences are assessed based on their severity and likelihood. First, the severity of this consequence changes based on the quantity of cells in a system, as well as the system's proximity to people and property. Therefore, the size and location of the installation should be taken into consideration. For Carmel Solar 3 PV facility, the location of the BESS and the fact that the area is sparsely populated will reduce the risk associated with toxic chemicals, flammability and overpressure from explosions. The risk level is seen to be of a low risk that is unlikely to occur with the proper safety measures taken as mitigation. Provided that the facility is designed and managed properly, and the batteries are handled in the manner prescribed by the manufacturer, an incident is unlikely to happen. However, because of the risk, special management actions are recommended in the EMPr to reduce the risk of an incident and manage an incident should one ever occur.

6.4 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 6.8.

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

6.4.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 6.6: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).

2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).

3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or		

potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated

		adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

7 CUMULATIVE EFFECTS ASSESSMENT

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

7.1 INTRODUCTION

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

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

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

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

7.2 GEOGRAPHIC AREA OF EVALUATION

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

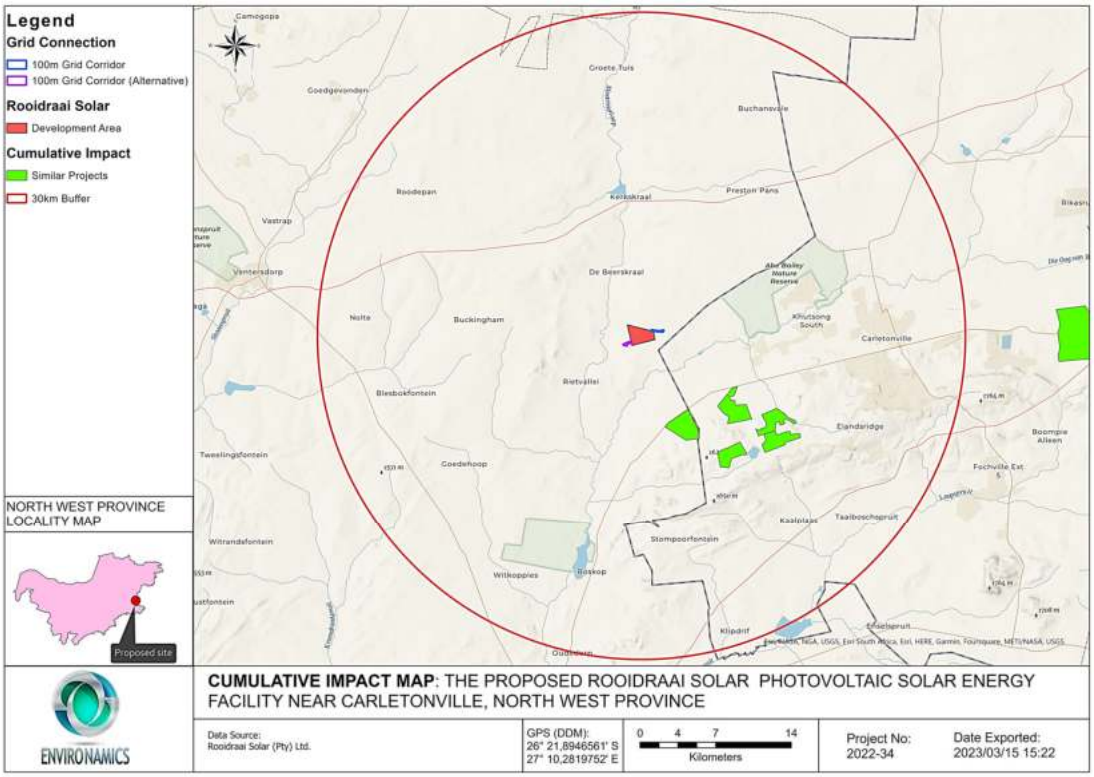


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

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

7.3 TEMPORAL BOUNDARY OF EVALUATION

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2023 and extending 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, five (05) solar PV plant applications have been submitted to the Department within the geographic area of investigation - refer to Table 7.1.

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

Site name	Distance from study area	Proposed generating capacity	DEFF Reference	EIA Process	Project status
Carmel Solar 1 PV facility	12,09km	240 MW	14/12/16/3/3/2/2310	Scoping and EIA	In process
Carmel Solar 2 PV facility	13.38km	240 MW	14/12/16/3/3/2/2311	Scoping and EIA	In process
Carmel Solar 3 PV facility	11.94km	240 MW	14/12/16/3/3/2/2313	Scoping and EIA	In process
Turffontein Solar 1 PV facility	7,14km	240 MW	14/12/16/3/3/2/2314	Scoping and EIA	In process
Varkenslaagte Solar PV facility	8,39km	240 MW	14/12/16/3/3/2/2312	Scoping and EIA	In process

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

7.5 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 eloped in the local area – refer to Figure 7.2 for process flow. The following sections present ir findings. The following sections present their findings.

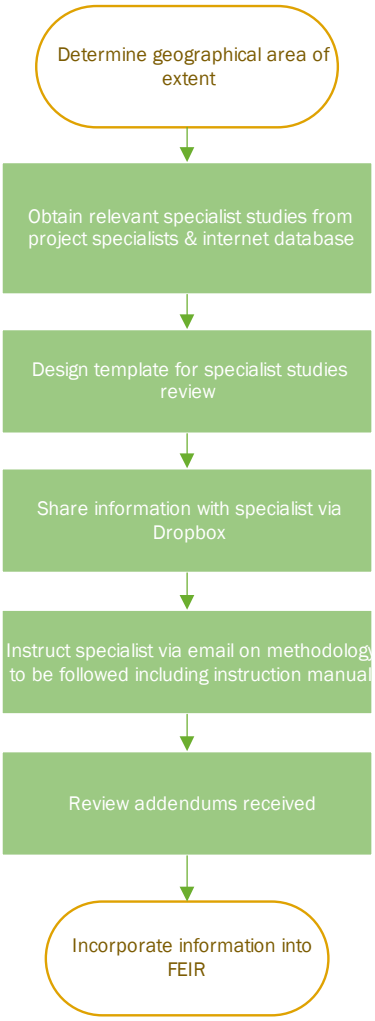


Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Terrestrial ecology

Cumulative impacts of developments on population viability of species can be reduced significantly if new developments are kept as close as possible to existing developed and/or transformed areas or, where such is not possible, different sections of a development be kept as close together as possible. Thus, new power lines should follow routes of existing servitudes if

such exist. Renewable energy facilities should be constructed as close as possible to existing infrastructure or substations, and if several developments are planned within close proximity, these developments should be situated as close together as possible, not scattered throughout the landscape.

The Terrestrial Biodiversity Assessment (refer to Annexure E2), considered existing renewable energy projects in terms of their potential cumulative terrestrial ecological impacts, that are in an approximate 30 km radius of the Rooidraai PV Solar Energy Facility. The combined, cumulative footprint of all renewable energy projects (located within the 30 km radius) is around 1650 ha, covering only 0.4% of the area within the 30 km radius. Of the 0.4%, the Rooidraai PV Solar Energy Facility will contribute 18%. Conclusion on cumulative impacts due to this and the surrounding developments:

- These renewable energy facilities (REFs) will impact a very small area of the 30 km area and will subsequently result in minimal transformation of intact habitats. Subsequently, the cumulative threat posed by these developments on the ecological functioning of these habitats are very small to insignificant, and it is unlikely that these REFS will result in significant habitat fragmentation, disruption of landscape connectivity, and impair the ability of these habitat types to respond to environmental fluctuations.

- Two of the other REFs are located within another vegetation type (Gauteng Shale Mountain Bushveld), with one REF predominantly located within Careltonville Dolomite Grassland, extending into the Gauteng Shale Mountain Bushveld, and the remaining two REFs located solely located within the Carletonville Dolomite Grassland. As such these developments will have a minimal impact on the Carletonville Dolomite Grassland (Least Concern), and subsequently will contribute minimally to the cumulative impact on the Carletonville Dolomite Grassland. As mentioned, this vegetation type has a large distribution and the combined loss of vegetation due to these developments will not threaten the status of this vegetation type.

- Excessive clearing of vegetation can, and will, influence runoff and stormwater flow patterns and dynamics, which could cause excessive accelerated erosion of plains, and this could also have detrimental effects on downslope freshwater resource systems. o Rehabilitation and revegetation of all surfaces disturbed or altered during construction is desirable.

- Runoff from sealed surfaces, or surfaces that need to be kept clear of vegetation to facilitate operation of a development, must be monitored regularly to ensure that erosion control and stormwater management measures are adequate to prevent the degradation of the surrounding environment.

- Large-scale disturbance of indigenous vegetation creates a major opportunity for the establishment of invasive species and the uncontrolled spread of alien invasives into adjacent agricultural land and rangelands. o A regular monitoring and eradication protocol must be part of all the developments' long term management plans.

- The loss of and transformation of intact habitats could compromise the status and ecological functioning of provincially identified CBAs. Of the five other REFs only two are located within the CBA2 area (corridor) whilst the other three REFS are located outside of this CBA2 corridor area. Subsequently, according to this layout, the Rooidraai PV Solar Energy Facility will slightly contribute to cumulative impacts on this CBA2 corridor and potentially the conservation targets set out by the province. However, due to the extent of this corridor and the remaining extent of natural vegetation, as well as the distance between these REFS, the Rooidraai PV Solar Energy Facility will not significantly contribute to the cumulative impact on this CBA corridor as well as the conservation targets set out by the province.

7.5.2 Visual

According to the Visual Impact Assessment (refer to Appendix E4), the proposed development is located in a close proximity of existing power infrastructure and might have a low cumulative impact on viewers. Several other SEFs are also proposed in the area and the potential for cumulative impacts to occur as a result of the projects are therefore very likely. The visual landscape mainly consists of agricultural and mining developments with a low visual quality. Permanent residents of the area might be desensitised over time with the construction of more SEFs, but will stay subjective for each viewer. The location of the SEFs within the study area will contribute to the consolidation of SEF structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

7.5.3 Soil, Land Capability and Agricultural Potential

According to the Agriculture Compliance Statement (Appendix E5), the cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment.

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

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this: What loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

Department of Forestry, Fisheries and the Environment (DFFE) requires compliance with a

specified methodology for the assessment of cumulative impacts. This is positive in that it ensures engagement with the important issue of cumulative impacts. However, the required compliance has some limitations and can, in the opinion of the author of the agricultural statement, result in an over-focus on methodological compliance, while missing the more important task of effectively answering the above defining question.

DFFE compliance for this project requires quantifying the impact of all renewable energy applications within a 30 km radius. There are a total of five renewable energy project applications within this radius of the proposed site. All of these projects have the same agricultural impacts in an almost identical agricultural environment, and therefore the same mitigation measures apply to all.

In quantifying the cumulative impact, the area of land taken out of grazing as a result of the five developments (total generation capacity of 1200 MW) will amount to a total of approximately 3875 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 1.37% of the surface area. That is well within an acceptable limit in terms of loss of land which is only suitable for grazing, of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

In order for South Africa to develop the renewable energy generation that it urgently needs, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land that is of limited agricultural potential than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country.

In terms of the loss of agricultural land to renewable energy, it should also be noted that renewable energy development can only be located in fairly close proximity to a substation that has available capacity. This effectively protects most agricultural land in the country from renewable energy development because only a small proportion of the country's total land surface is located in close enough proximity to an available substation to be viable for renewable energy development.

As discussed above, the risk of a loss of agricultural potential by soil degradation can effectively be mitigated for renewable energy developments. The risk for each individual development is low and the cumulative risk is also low.

Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential is assessed as low. It will not have an unacceptable negative impact on the agricultural production capability of the area and it is therefore recommended that the development be approved.

7.5.4 Heritage

The Heritage Impact Assessment (Refer to Appendix E6), states that from a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Rooidraai Solar Site is in an area with a low presence of heritage sites and features. The following applies:

- Less frequently found are artefacts dating to the Stone Age. Those that have been reported on mostly date to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance (Orton 2016).
- There is also a limited Late Iron Age element. Stone walled sites are scattered all over, especially on the higher, more rocky areas to the south.
- The historic period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For this review, heritage sites located in urban areas have been excluded.

Heritage resources which can be classified as highly significant (Grade 1) are absent from the region. However, Grade 2 sites, dating to the Late Iron Age as well as the historic times occur sporadically all over.

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

7.5.5 Palaeontology

According to the Palaeontological Impact Assessment (refer to Appendix E7), 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 Province specific temporal or spatial impacts of a resource. For example, the socioeconomic 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.

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis is 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.

The general Palaeontological Sensitivity of the area is Low to High. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between Low and Medium.

7.5.6 Social Impact Assessment

According to the Social Impact Assessment (refer to Appendix E8), the Rooidraai SEF and the establishment of other SEFs 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 Rooidraai SEF alone.

While the development of a single SEF may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterized by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.

It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

7.5.7 Traffic

According to the Traffic Impact Assessment (refer to Appendix E9), to assess a cumulative impact, it is generally assumed that all currently approved and authorized projects within a 30 km radius would be constructed at the same time. This is a precautionary approach as in reality, these

projects would be subject to a highly competitive bidding process and not all the projects may be selected to enter into a Power Purchase Agreement. Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when operational, do not add any significant traffic to the road network.

7.6 IMPACT ASSESSMENT

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

7.6.1 Potential Cumulative Effects

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

Table 7.2: Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Aquatic Ecology Impact Assessment	Impacts on the aquatic resources of the area	The cumulative impact assessment considers the combined impact of the remaining and other renewable projects within a 30 km radius, that are also in the development phase and the associated grid lines on the aquatic resources. The rating below is based on the premised that important or sensitive features will be avoided by the various projects, while the mitigations proposed will ensure that the	- Low

		form and or function of downstream areas remain intact.	
Social Impact Assessment	An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.	The establishment of several SEFs under the REIPPP Programme in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted, and local services providers are utilised by the developers to maximise the project opportunities available to the local community.	+ Medium
	Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.	While the development of a single SEF may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.	- Medium
Traffic Impact Study	Further increase of development trips during construction phase if the developments listed in Table 7.1 will be constructed at the same time as the proposed Rooidraai Solar Photovoltaic Solar Energy Facility.	It is noted that it is unlikely that all developments will be constructed at the same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the respective projects.	- Medium
Operational Phase			
Visual Impact Assessment	Cumulative visual impacts related to the SEF and PL.	The anticipated cumulative visual impact for the SEF and power line are expected to include the change in sense of place, as well as the precedent being set for SEFs in the area where currently there is only a precedent for agricultural and mining related	- Low

		activities. Further construction and operation of the SEF in the area is likely to have a negative impact.	
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 Draft EIR addressed the cumulative environmental effects of the construction, operation and decommissioning project phases to be further assessed as part of the EIA Phase. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
  - Impacts on the aquatic resources of the area (- Low)
  - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
  - Impact with large-scale in-migration of people (- Medium)
  - Further increase of development trips during construction phase if the developments (-Medium)
- Cumulative effects during the operational phase:
  - Visual intrusion (- Medium)
- Cumulative effects during the decommissioning phase:
  - Generation of waste (- Medium)

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

Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting

industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. No cumulative impacts with a high residual risk have been identified.

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

8 ENVIRONMENTAL IMPACT STATEMENT

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

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

(l) an environmental impact statement which contains-

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

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

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

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

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

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

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which were addressed in this EIA report: *(Note the pre-mitigation impact rating is included here)*

- Impacts during construction phase:
    - Direct habitat destruction (- Medium)
    - Habitat Fragmentation (- Medium)
    - Impact on the characteristics of the watercourse (- Medium)
    - Creation of direct and indirect employment opportunities (+ Medium)
    - Economic multiplier effects from the use of local goods and services (+ Medium)
    - Impacts on daily living patterns (- Medium)

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

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

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

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

The only no-go area was an avifaunal water point in the northwest corner of the site, this has been avoided. The sensitive features related to the aquatic ecology includes the Channelled Valley Bottom wetlands and grassland seepages areas. Further mitigation measures for the development, as recommended by the independent specialists, have been included in the EMPr(s) for the project as per Appendix F.

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

The key components of the proposed project are described below:

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

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

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480 V up to 33 kV up to 132 kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480 V and this is fed into step up transformers to 132 kV. An onsite substation will be required to step the voltage up to 132 kV, after which the power will be evacuated into the national grid. It is expected that generation from the facility will tie in with existing grid infrastructure present within the affected property/ies.

  The auxiliary infrastructure and the Electricity Grid Infrastructure (EGI) are located in the south-western corner of the facility. A 132kV Loop-In-Loop-Out (LILO) power line from the Eskom switching station will connect into the Hardeklip TR/ Mooirivier RR 1 132kV Feeder Conductor. The EGI is located within a 100 m wide assessment corridor.

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

- Supporting Infrastructure – The following auxiliary buildings including a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre will be required as well as a 33kV switch room. The project requires the need for both temporary and permanent laydown areas.

- Battery Energy Storage System – A Battery Storage Facility with a maximum height of 8m and development footprint of ~5 ha and associated operational, safety and control infrastructure.

- Roads – The majority of the access road will follow existing, gravel farm roads that may require widening up to 10 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 (up to 33 km), each with a width of up to ± 6 m, will be constructed to provide access to the various components of the PV development. Two access points are proposed as alternatives. The majority of the access roads will follow existing, gravel farm roads that may require widening of up to 10 m (inclusive of storm water infrastructure), although approximately 1.7km of the preferred route is new and will require clearing of vegetation since it does not follow an existing track. Where new sections of road need to be constructed (/lengthened), this will be gravel/hard surfaced access roads and only tarred if necessary.

- 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 3.5 meters will be used.

8.4 RECOMMENDATION OF EAP

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

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

In terms of the contents and substance of the EIA report the EAP is confident that:

- All key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP 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. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures and avoidance of certain areas within the site as recommended by the specialists. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Rooidraai Solar PV facility be approved subject to the following conditions:

- Access Road 1 is approved.
- Implementation of the proposed mitigation measures set out in the EMPrs (Appendix F)
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.

- All actions and tasks allocated in the EMPr should not be neglected and a copy of the EMPr should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- The required biodiversity walk-throughs must be undertaken prior to construction after which time an Alien Invasive Management Plan must be compiled and sent to this Department for approval prior to construction activities being undertaken.
- The period for which the Environmental Authorisation is required is between 7 and 10 years. This is based on the fact that the project is proposed to be bid as part of the DMRE REIPPP Programme, with there being uncertainty regarding the announcement of the next bidding rounds, and the need for a valid Environmental Authorisation. It must however be noted that the project will also participate in other programs/opportunities to generate power in South Africa, as available.

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

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