

Prepared for:
ABO Wind Renewable
Energies (Pty) Ltd



Scoping and Environmental Impact Assessment (EIA) Process
for the
PROPOSED DEVELOPMENT OF A SOLAR PHOTOVOLTAIC (PV)
FACILITY (KUDU SOLAR FACILITY 1) AND ASSOCIATED
INFRASTRUCTURE, NEAR DE AAR, NORTHERN CAPE PROVINCE

JULY 2023



FINAL
ENVIRONMENTAL
IMPACT
ASSESSMENT
REPORT

Prepared by:
Council for Scientific and
Industrial Research (CSIR)



PART A: MAIN REPORT



SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

for the

**Proposed Development of a Solar Photovoltaic (PV)
Facility (Kudu Solar Facility 1) and associated
infrastructure, near De Aar, Northern Cape Province**

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

July 2023

Prepared for:

ABO Wind renewable energies (Pty) Ltd

Prepared by:

Council for Scientific and Industrial Research (CSIR)

P. O. Box 320, Stellenbosch, 7599; Tel: 021 888 2400

Postnet Suite 367, Private Bag x10, Musgrave Road, 4062; Tel: 031 242 2300

Lead Authors:

Paul Lochner, Rohaida Abed, Helen Antonopoulos, Sonto Mkize, and Phindile Mthembu (CSIR)

Specialists:

Johann Lanz, Corné Niemandt, Samuel Laurence, Antonia Belcher, Dana Grobler, Chris van Rooyen, Albert Froneman, Quinton Lawson, Bernard Oberholzer, Dr. Jayson Orton, Dr. John Almond, Tony Barbour, Schalk van der Merwe, Annebet Krige, Debbie Mitchell, Shane Teek, Dale Barrow, Julian Conrad, Louis Jonk, Hardy Luttig, and Christel van Staden

Mapping:

Luanita Snyman-Van der Walt (CSIR)

Formatting and Desktop Publishing:

Magdel van der Merwe (DTP Solutions)

REPORT DETAILS

Title:	Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and associated infrastructure, near De Aar in the Northern Cape Province: FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT			
Purpose of this report:	<p>The purpose of this EIA Report is to:</p> <ul style="list-style-type: none"> ▪ Present the details of and the need for the proposed project; ▪ Describe the affected environment at a sufficient level of detail based on specialist input to facilitate informed decision-making; ▪ Provide an overview of the EIA Process that has been followed, including public consultation; ▪ Provide an overview of the potential positive and negative impacts of the proposed project on the environment; ▪ Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; and ▪ Provide an Environmental Management Programme (EMPr) for the relevant phases of the project. <p>The Draft EIA Report was released to all Interested and/or Affected Parties (I&APs), Organs of State and relevant stakeholders for a 30-day review period extending from 2 June 2023 to 3 July 2023, excluding public holidays. All comments submitted during the 30-day review period have been incorporated in the Comments and Responses Report, and addressed, as applicable and where relevant, and included as an appendix in this Final EIA Report. This Final EIA Report has been submitted to the National Department of Forestry, Fisheries and the Environment (DFFE) for decision-making.</p>			
Prepared for:	ABO Wind renewable energies (Pty) Ltd			
	<p>Contact Persons:</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Du Toit Malherbe Phone: 021 276 3620 Email: capetown@abo-wind.com</td> <td style="width: 50%;">Petrus Scheepers Phone: 021 276 3620 Email: capetown@abo-wind.com</td> </tr> </table>		Du Toit Malherbe Phone: 021 276 3620 Email: capetown@abo-wind.com	Petrus Scheepers Phone: 021 276 3620 Email: capetown@abo-wind.com
Du Toit Malherbe Phone: 021 276 3620 Email: capetown@abo-wind.com	Petrus Scheepers Phone: 021 276 3620 Email: capetown@abo-wind.com			
Prepared by:	CSIR:			
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">P. O. Box 320, Stellenbosch, 7599 Tel: 021 888 2400 Email: ems@csir.co.za</td> <td style="width: 50%;">Postnet Suite 367, Private Bag x10, Musgrave Road, 4062 Tel: 031 242 2300 Email: ems@csir.co.za</td> </tr> </table>		P. O. Box 320, Stellenbosch, 7599 Tel: 021 888 2400 Email: ems@csir.co.za	Postnet Suite 367, Private Bag x10, Musgrave Road, 4062 Tel: 031 242 2300 Email: ems@csir.co.za
P. O. Box 320, Stellenbosch, 7599 Tel: 021 888 2400 Email: ems@csir.co.za	Postnet Suite 367, Private Bag x10, Musgrave Road, 4062 Tel: 031 242 2300 Email: ems@csir.co.za			
Lead Authors:	Paul Lochner, Rohaida Abed, Helen Antonopoulos, Sonto Mkize, and Phindile Mthembu (CSIR)			
Mapping: Specialists:	Luanita Snyman-Van der Walt (CSIR)			
	Johann Lanz, Corné Niemandt, Samuel Laurence, Antonia Belcher, Dana Grobler, Chris van Rooyen, Albert Froneman, Quinton Lawson, Bernard Oberholzer, Dr. Jayson Orton, Dr. John Almond, Tony Barbour, Schalk van der Merwe, Annebet Krige, Debbie Mitchell, Shane Teek, Dale Barrow, Julian Conrad, Louis Jonk, Hardy Luttig, and Christel van Staden			
Formatting and Desktop Publishing:	Magdel van der Merwe, DTP Solutions			
Date:	July 2023			
DFFE Reference No:	14/12/16/3/3/2/2244			
To be cited as:	CSIR, 2023. Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and associated infrastructure, near De Aar in the Northern Cape Province. Environmental Impact Assessment Report. CSIR Report Number: CSIR/SPLA/SECO/ER/2022/0051/B			

CONTENTS

PART A: MAIN REPORT

Executive Summary	
Chapter 1	Introduction
Chapter 2	Project Description
Chapter 3	Description of the Affected Environment
Chapter 4	Approach to EIA Process and Public Participation
Chapter 5	Project Alternatives
Chapter 6	Agriculture Compliance Statement
Chapter 7	Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species Assessment
Chapter 8	Aquatic Biodiversity and Species Assessment
Chapter 9	Avifauna Assessment
Chapter 10	Visual Impact Assessment
Chapter 11	Heritage Impact Assessment (Archaeology and Cultural Heritage)
Chapter 12	Palaeontology
Chapter 13	Socio-Economic Assessment
Chapter 14	Traffic Impact Assessment
Chapter 15	Battery Energy Storage Systems High Level Risk Assessment
Chapter 16	Geohydrology Assessment
Chapter 17	Geotechnical Assessment
Chapter 18	Civil Aviation Site Sensitivity Verification
Chapter 19	Defence Site Sensitivity Verification
Chapter 20	Conclusions and Recommendations

PART B: APPENDICES	
Appendix A	Curriculum Vitae of the Environmental Assessment Practitioners
Appendix B	Declaration of Independence of the Environmental Assessment Practitioner
Appendix C	Maps
Appendix D	Pre-Application Consultation with the Competent Authority
Appendix E	Database of Interested and Affected Parties
Appendix F	Public Participation for the Scoping Phase
Appendix G	DFFE Acceptance of the Final Scoping Report
Appendix H	Public Participation for the EIA Phase
Appendix I	Environmental Management Programme for the PV Facility and Associated Infrastructure
Appendix J	Generic Environmental Management Programme for the On-Site Substation
Appendix K	Additional Information

EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT LOCALITY

The Project Developer, Kudu Solar Facility 1 (Pty) Ltd (hereafter “Project Applicant” or “Project Developer”) is proposing to develop a Solar Photovoltaic (PV) power generation facility and associated Electrical Grid Infrastructure (EGI), north-east of the town of De Aar in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province. The proposed projects are located approximately 50 km from De Aar and 25 km from Petrusville. A total of 12 Solar PV Facilities are being proposed. Each project will have a specific Project Applicant. The proposed projects are referred to as the “Kudu project”. A locality map is provided in Figure A.

ABO Wind renewable energies (Pty) Ltd (hereafter “ABO Wind”) is involved in the development proposal stage, however the responsibility for the actual implementation of the project (should Environmental Authorisation (EA) and relevant approvals be granted) lies with the Project Developer / Project Applicant (i.e., Kudu Solar Facility 1 (Pty) Ltd)).

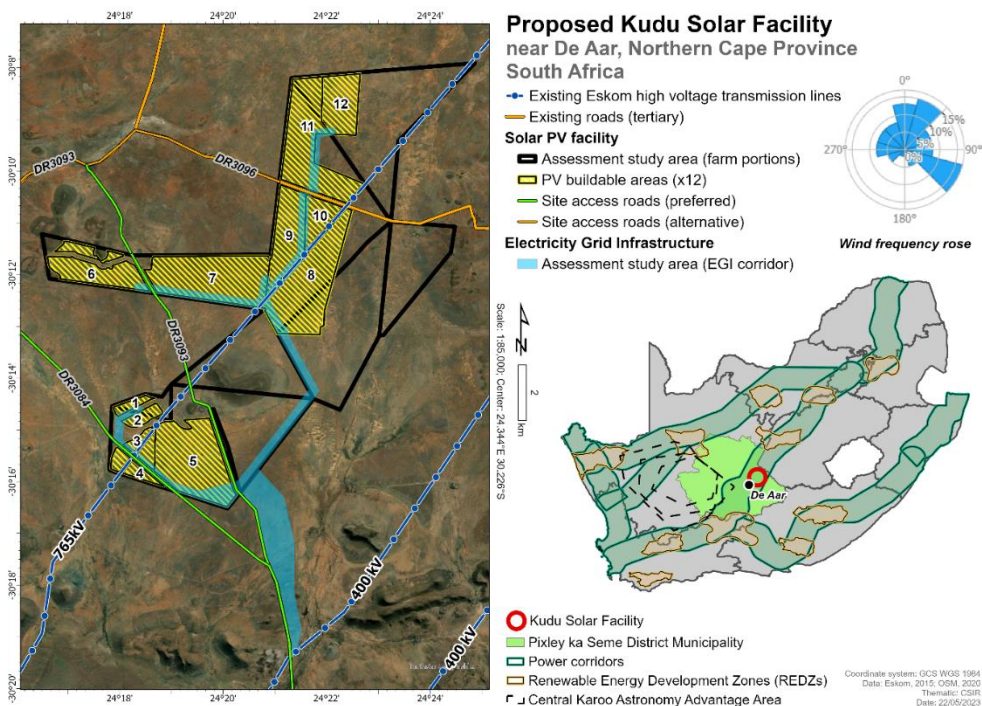


Figure A. Locality Map of the proposed Kudu Projects. Note that the EGI Projects are not part of the current application and report. The EGI Projects will be considered separately at a later stage. The EGI corridor indicated in this Figure is indicative.

The proposed Solar PV Facilities will make use of PV solar technology to generate electricity from energy derived from the sun. Each solar PV Facility will have a range of associated infrastructure, including, but not limited to, an on-site substation complex, Battery Energy Storage System (BESS), and is proposed to connect to the existing Hydra-Perseus 400 kV overhead power line via dedicated proposed 132 kV power lines, an independent Main Transmission Substation (MTS), and a 400 kV Loop-In-Loop-Out (LILO).

Each of the Solar PV Facilities would be its own project and would require its own, separate EA. The same applies to the EGI projects. The following projects are being proposed (illustrated in Figure B):

- **PROJECTS 1 TO 12:** The proposed development of 12 Solar PV Facilities and associated infrastructure (i.e. Kudu Solar Facility 1 to Kudu Solar Facility 12¹).
- **PROJECTS 13 TO 24:** The proposed development of switching stations and collector stations at each on-site substation complex at each of the 12 Kudu Solar Facilities, and up to 12 x 132 kV overhead power lines running from each Solar PV Facility to the proposed collector stations or up to the proposed MTS.
- **PROJECT 25:** The proposed development of an independent 400/132 kV MTS, including associated infrastructure at the MTS.
- **PROJECT 26:** The proposed development of a 400 kV LILO from the existing Hydra-Perseus 400 kV overhead power line to the proposed MTS.

Scoping and EIA Processes x 12		BA Processes x 12 or Standard Registration Processes x 12 or hybrid approach		
Project 1: Kudu Solar Facility 1	Project 7: Kudu Solar Facility 7	Project 13: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 1	Project 19: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 7	Project 25: Independent 400/132 kV MTS and associated infrastructure
Project 2: Kudu Solar Facility 2	Project 8: Kudu Solar Facility 8	Project 14: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 2	Project 20: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 8	Project 26: 400 kV Loop-In-Loop-Out (LILO) from the existing Hydra-Perseus 400 kV line to the proposed MTS
Project 3: Kudu Solar Facility 3	Project 9: Kudu Solar Facility 9	Project 15: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 3	Project 21: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 9	
Project 4: Kudu Solar Facility 4	Project 10: Kudu Solar Facility 10	Project 16: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 4	Project 22: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 10	
Project 5: Kudu Solar Facility 5	Project 11: Kudu Solar Facility 11	Project 17: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 5	Project 23: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 11	
Project 6: Kudu Solar Facility 6	Project 12: Kudu Solar Facility 12	Project 18: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 6	Project 24: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 12	

Figure B: Breakdown of the projects that comprise the Kudu Solar Facilities and EGI cluster.

¹ Note that throughout the report the term Solar Facility and PV are used synonymously. For example, Kudu Solar Facility 1 and Kudu PV1 are used interchangeably.

Projects 1 to 12 require Scoping and Environmental Impact Assessment (EIA) Processes in terms of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended). Projects 13 to 26 will require Basic Assessment (BA) Processes or will be subjected to separate registration processes in terms of the EGI Standard (Government Gazette (GG) 47095; Government Notice (GN) 2313, dated 27 July 2022).

Note that separate reporting will also be followed for Projects 13 to 26 based on the relevant environmental management instrument implemented at the time. Projects 13 to 26 are not the subject of this current EIA Report.

This EIA Report only addresses Kudu Solar Facility 1 (i.e., Project 1) (hereafter referred to as the “Kudu Solar Facility” or “proposed project”), and separate reports have been compiled for each of the Solar PV Facilities (i.e., Projects 1 to 12).

The proposed project is not located within any of the Renewable Energy Development Zones (REDZs) that were gazetted in GG 41445, GN 114 on 16 February 2018; and GG 44191, GN 144 on 26 February 2021, hence it is subjected to a full Scoping and EIA Process with a 107-day decision-making timeframe, as opposed to a BA Process and 57-day decision-making timeframe allowed for in the REDZs. The proposed project is located within the Central Strategic Transmission Corridor that was gazetted in GN 113 on 16 February 2018; however, the benefits only apply specifically to the EGI projects (Projects 13 – 26). This is depicted in Figure A.

The Competent Authority for this proposed project is the National Department of Forestry, Fisheries and the Environment (DFFE). It is intended that this project will be bid into a future bidding program of the Renewable Energy Independent Power Producer Programme (REIPPPP) [or another future process linked to the IRP].

Study Area and Buildable Areas

The study area or preferred site for all 12 of the Kudu Solar Facilities constitutes the full extent of the eight affected farm portions indicated in Table A. The total extent of the study area is approximately 8 150 hectares (ha). The preferred site serves as the study area for this Scoping and EIA Process.

Table A: Farm portions and SG codes for the Study Area.

FARM PORTION	SG CODE
Remaining Extent of the Farm Bas Berg No. 88	C05700000000008800000
Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	C05700000000008800003
Portion 4 (Portion of Portion 3) of the Farm Bas Berg No. 88	C05700000000008800004
Remaining Extent of Portion 2 (Middel Plaats) (a Portion of Portion 1) of the Farm Grasspan No. 40	C05700000000004000002
Remaining Extent of the Farm Annex Wolve Kuil No. 41	C05700000000004100000
Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41	C05700000000004100001
Portion 2 of the Farm Wolve Kuil No. 43	C05700000000004300002
Remaining Extent of the Farm Wolve Kuilen No. 42	C05700000000004200000

At the commencement of this Scoping and EIA Process, the Original Scoping Buildable Areas were identified by the Project Developer following the completion of high-level environmental screening based on the Screening Tool.

Following the identification of sensitivities during the Scoping Phase, the Project Developer considered such sensitivities and formulated the Revised Scoping Buildable Areas. The Revised Scoping Buildable Areas were used to inform the design of the layout, and further assessed during this EIA Phase of the project in order to identify the preferred development footprint of the proposed project on the approved site as contemplated in the accepted Scoping Report.

PROJECT ENVIRONMENTAL IMPACT ASSESSMENT TEAM

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), ABO Wind appointed the Council for Scientific and Industrial Research (CSIR) to undertake the required Scoping and EIA Process in order to determine the potential biophysical, social and economic impacts associated with undertaking the proposed development. The project team and the relevant specialists are indicated in Table B below.

Table B. Project Team for the Scoping and EIA Process.

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
<i>Environmental Management Services (CSIR)</i>		
Paul Lochner (<i>Registered EAP (2019/745)</i>)	CSIR	EAP, Technical Advisor and Quality Assurance
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>)	CSIR	EAP and Project Manager
Helen Antonopoulos	CSIR	Project Officer
Sonto Mkize	CSIR	Project Officer
Phindile Mthembu	CSIR	Project Officer
Luanita Snyman van der Walt (<i>Pr.Sci.Nat.</i>)	CSIR	GIS Specialist
Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Public Participation Specialist
<i>Specialists</i>		
Johann Lanz (<i>Pr.Sci.Nat.</i>)	Private	Agriculture and Soils Compliance Statement
Corne Niemandt (<i>Pr.Sci.Nat.</i>) Samuel Laurence (<i>Pr.Sci.Nat.</i>)	Enviro-Insight cc	Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species
Toni Belcher (<i>Pr.Sci.Nat.</i>) Dana Grobler (<i>Pr.Sci.Nat.</i>)	Private	Aquatic Biodiversity Impact Assessment
Chris van Rooyen Albert Froneman (<i>Pr.Sci.Nat.</i>)	Chris van Rooyen Consulting	Avifauna Impact Assessment
Quinton Lawson (<i>SACAP, 3686</i>) Bernard Oberholzer (<i>SACLAP, 87018</i>)	QARC and BOLA	Visual Impact Assessment
Dr Jayson Orton (<i>APHP: Member 43; ASAPA CRM Section: Member 233</i>)	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
Dr John Almond (<i>PSSA and APHP Member</i>)	Natura Viva cc	Palaeontology Site Sensitivity Verification Report
Tony Barbour and Schalk van der Merwe	Private	Socio-Economic Impact Assessment
Annebet Krige (<i>Pr Eng</i>)	Sturgeon Consulting	Traffic Impact Assessment
Debbie Mitchell (<i>Pr Eng</i>)	Ishecon cc	Battery Storage High Level Safety, Health and Environment Risk Assessment

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Dale Barrow (<i>Pr.Sci.Nat.</i>) Christel van Staden (<i>Cand.Sci.Nat.</i>) Shane Teek (<i>Cand.Sci.Nat.</i>) Louis Jonk (<i>Pr.Sci.Nat.</i>) Julian Conrad	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment
Shane Teek (<i>Cand.Sci.Nat.</i>) Hardy Luttig Julian Conrad	GEOSS South Africa (PTY) Ltd	Geotechnical Assessment
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>) Helen Antonopoulos Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Civil Aviation Site Sensitivity Verification
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>) Helen Antonopoulos Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Defence Site Sensitivity Verification

The specialist assessments have been detailed during the EIA Phase and comply with Appendix 6 of the 2014 NEMA EIA Regulations (as amended), or the Assessment Protocols published in GN 320 on March 2020; or the Assessment Protocols published in GN 1150 on October 2020. However, the BESS High Level Safety, Health and Environment Risk Assessment serves as a technical report and the aforementioned legislation will thus not be applicable.

PROJECT DESCRIPTION

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed design and engineering phase prior to construction (subsequent to the issuing of EA, should it be granted for the proposed project). A summary of the key components of the proposed project is provided in Table C below.

Table C. Summary of the proposed project components and associated infrastructure.

Component	Description
Solar Field	
Type of Technology	Solar Photovoltaic (PV) Technology
Generation Capacity (Maximum Installed)	<ul style="list-style-type: none"> ▪ Up to 50 MWac
Total developable area that includes all associated infrastructure within the fenced off area of the PV facility	<ul style="list-style-type: none"> ▪ Approximately 34 ha
PV Panel Structure (with the following possible tracking and mounting systems): <ul style="list-style-type: none"> ▪ Single Axis Tracking structures (aligned north-south); ▪ Dual Axis Tracking (aligned east-west and north-south); ▪ Fixed Tilt Mounting Structure; ▪ Mono-facial Solar Modules; or ▪ Bifacial Solar Modules. 	<ul style="list-style-type: none"> ▪ <u>Height</u>: Approximately 3.5 m (maximum)
Building Infrastructure	
Auxiliary Buildings	<ul style="list-style-type: none"> ▪ <u>Type</u>: These include, but are not limited to, Operation and Maintenance (O&M) building / centre, site office, workshop,

Component	Description
	<p>staff lockers, bathrooms/ablutions, warehouses, guard houses, etc.</p> <ul style="list-style-type: none"> ▪ <u>Cumulative Footprint</u>: Approximately up to 5000 m² ▪ <u>Height</u>: Up to 10 m
Inverter/Transformer Stations	<ul style="list-style-type: none"> ▪ <u>Preliminary average number of stations</u>: 27 ▪ <u>Height</u>: Approximately 3 m ▪ <u>Footprint</u>: Approximately 220 m² each
On-site Substation Complex	<ul style="list-style-type: none"> ▪ <u>Components of the on-site substation complex</u>: <ul style="list-style-type: none"> ○ On-site Independent Power Producer (IPP) or Facility Substation (~1 ha)². ○ Solid State Lithium Ion or Redox Flow Battery Energy Storage System. Refer to the details below. ○ Switching Station and Collector Station (~2 ha). This forms part of Projects 13 – 24 and will be assessed as part of separate processes. It is important to mention here for contextualisation (it does not appear in the Application for EA or relevant listed activities). ▪ <u>Footprint of the on-site substation complex</u>: Up to approximately 8 ha ▪ <u>Height of the on-site substation complex</u>: Up to 10 m ▪ <u>Capacity of the on-site substation complex</u>: This varies according to the detailed design and requirements from potential clients, however a capacity stepping up from 22 kV or 33 kV to 132 kV is estimated.
Associated Infrastructure	
Battery Energy Storage System (BESS)	<ul style="list-style-type: none"> ▪ <u>Technology</u>: Solid State Lithium-Ion BESS or Redox Flow BESS (both options have been considered in the Scoping and EIA Process). Both technologies were deemed acceptable by the Environmental Assessment Practitioner (EAP) and specialists. However, the DFFE requested that preferred technology be selected. Therefore, Solid State Lithium Ion BESS is selected as the preferred technology for authorisation. However, should the need to change the technology arise in future, it is understood that an EA amendment process can be followed as both technologies have been assessed as part of the EIA Phase. ▪ <u>Footprint</u>: Approximately 1 ha ▪ <u>Height</u>: Up to 10 m ▪ <u>Capacity</u>: Up to 500 MW / 500 MWh

² As confirmed with the DFFE, the on-site substation complex can be included within the current Application for EA.

Component	Description
On-site medium voltage internal cables	<ul style="list-style-type: none"> ▪ <u>Placement</u>: Underground or above ground in certain sections ▪ <u>Capacity</u>: 22 or 33 kV ▪ <u>Depth</u>: Maximum depth of 1.5 m
Underground low voltage cables or cable trays	<ul style="list-style-type: none"> ▪ <u>Depth</u>: Maximum depth of 1.5 m
Access roads (including upgrading and widening of existing roads, where relevant)	<ul style="list-style-type: none"> ▪ <u>Details</u>: Existing roads will be used as far as practically achievable to access the site. The Traffic Specialist has noted that the main roads leading to the proposed project site are of a sufficient width. However, upgrading of the main access point from the R48 will be required. This is specifically at the intersection of the TR38/01 (i.e. R48) and DR3093, which will require an existing island of approximately 60 m² to be removed and surfaced to accommodate the turning movements of vehicles.
Internal roads	<ul style="list-style-type: none"> ▪ <u>Details</u>: New internal service roads will need to be established (i.e. new roads within the fenced off area of the PV Facility, and new roads between the closest existing road and the PV Facility to gain access). These would either comprise farm roads (compacted dirt/gravel) or paved roads. ▪ <u>Width</u>: <ul style="list-style-type: none"> ○ Within the PV Facility: Up to 5 m ○ Between the existing road and PV Facility: Up to 8 m
Fencing around the PV Facility Perimeter	<ul style="list-style-type: none"> ▪ <u>Type</u>: Could be palisade, mesh or fully electrified. A single perimeter fence is proposed around the PV Facility. ▪ <u>Height</u>: Up to 3 m
Storm water channels	<ul style="list-style-type: none"> ▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Panel cleaning and maintenance area	<ul style="list-style-type: none"> ▪ The type of panels to be used (and panel cleaning) will be confirmed during detailed design/engineering phase. The panel cleaning and maintenance area will form part of the O&M Auxiliary Buildings (located at the on-site substation complex).
Work area during the construction phase (i.e. laydown area)	<ul style="list-style-type: none"> ▪ Temporary Laydown: Up to 7 ha. ▪ The need for a permanent laydown area will be confirmed during the detailed design/engineering phase.
Water Requirements	<ul style="list-style-type: none"> ▪ Approximately 9 000 m³ of water is estimated to be required per year for the construction phase. ▪ Approximately 1 000 m³ of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are unknown at this stage, however they are expected to be similar to the construction phase. ▪ Potential sources: Local municipality, third-party water supplier, existing boreholes or drilled boreholes on site.

Component	Description
Construction Period	<ul style="list-style-type: none"> ▪ 12 – 18 months
Operational Period	<ul style="list-style-type: none"> ▪ Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 years.

APPROACH TO THE EIA PROCESS

As noted above, in terms of the 2014 NEMA EIA Regulations (as amended), a full Scoping and EIA Process is required for the proposed project. The need for the Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure”.*

Chapter 4 of the EIA Report contains the detailed list of activities contained in GN R327, R325 and R324 which are triggered by the various project components and thus form part of this Scoping and EIA Process.

The Public Participation Process (PPP) for this Scoping and EIA Process is being undertaken in compliance with Chapter 6 of the 2014 NEMA EIA Regulations (as amended). An integrated PPP is being undertaken for all 12 proposed Solar PV facilities. The Scoping and EIA Process commenced in December 2022, and a pre-application meeting with the National DFFE was held on 26 April 2022 (Reference Number: 2022-04-0005). The Draft Scoping Report was made available for a 30-day comment period in December 2022, and the Final Scoping Report was submitted to the DFFE in February 2023, and thereafter accepted in March 2023.

The Draft EIA Report was made available to all Interested and/or Affected Parties (I&APs), Organs of State and relevant stakeholders for a 30-day review period, extending from **2 June 2023 to 3 July 2023**. The Draft EIA Report was uploaded to the project website (i.e., <https://www.csir.co.za/environmental-impact-assessment>) for potential and registered I&APs to access it. As a supplementary mechanism, the Draft EIA Report was also uploaded to an alternative web-platform i.e., Google Drive. Written notification of the commencement of the EIA Phase and the availability of the Draft EIA Report for comment was sent to all potential and registered I&APs, Organs of State and key relevant stakeholders included on the project database via email, where email addresses were available. This notification was sent at the commencement of the 30-day review period on the Draft EIA Report and included information on the proposed project and notification of the release and availability of the report. Various reminder emails were also sent to the stakeholders, and key stakeholders were called telephonically, followed by a confirmation of discussion email or text message. Refer to Appendix H.4 of this EIA Report for proof of such correspondence. Copies of all written comments received during the 30-day review of the Draft EIA Report have been incorporated into a detailed Comments and Responses Report, and addressed, as applicable and where relevant, and included in this Final EIA Report. The Final EIA Report (i.e., this report) has been submitted to the DFFE, in accordance with Regulation 23 of the 2014 NEMA EIA Regulations (as amended), for decision-making.

SUMMARY OF IMPACT ASSESSMENT FINDINGS AND RECOMMENDED MANAGEMENT ACTIONS

The findings and impact assessment of the detailed specialist assessments (included as Chapters 6 to 17), as well as other relevant project information are included and integrated into the EIA Report. An Environmental Management Programme (EMPr) for the Solar PV Facility and a Generic EMPr for the on-site substation are included in Appendix I and J of this EIA Report, respectively. The EMPr is based on the recommendations for mitigation measures and management actions provided by the specialist team for the planning and design, construction, operational and decommissioning phases of the proposed project.

This section provides a summary of the key impacts that were identified and assessed in detail by the specialists during the EIA Phase. Note that several mitigation measures have also been provided by the specialists, however only selected key measures are noted in Table D below.

Table D. Summary of Issues and Key Impacts that were identified and assessed during the EIA Phase as part of the Specialist Impact Assessments, including recommended mitigation measures and management actions.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
<p>Chapter 6 – Agriculture Compliance Statement</p>	<p><u>Negative Direct Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> • Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination. • Loss of agricultural potential by dust generation. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> • Loss of agricultural potential by soil degradation. Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination. • Loss of agricultural potential by dust generation. <p><u>Positive Indirect Impacts (mainly during operations):</u></p> <ul style="list-style-type: none"> • Increased financial security for farming operations. • Improved security against stock theft and other crime due to the presence of security infrastructure and security personnel at the energy facility. 	<p>Design Phase:</p> <ul style="list-style-type: none"> • Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. This is included in the stormwater management plan. <p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> • Implement an effective system of stormwater run-off control, where it is required (as specified above). • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. • If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. <p>Operational Phase:</p> <ul style="list-style-type: none"> • Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring. • Facilitate re-vegetation of denuded areas throughout the site.
<p>Chapter 7: Terrestrial Biodiversity, Terrestrial Plant Species,</p>	<p><u>Negative Direct Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> • Habitat loss and fragmentation • Loss of protected species 	<p>Construction Phase:</p> <ul style="list-style-type: none"> • No development should take place within High sensitivity areas or buffer zones. Accordingly, the Koppies habitat (where relevant) should be avoided. The Watercourse habitats of medium sensitivity

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
<p>and Terrestrial Animal Species Assessment</p>	<ul style="list-style-type: none"> • Increased alien invasive species • Increased erosion and soil compaction • Littering and general pollution <p>Operational Phase:</p> <ul style="list-style-type: none"> • Loss of species composition and diversity • Increased alien invasive species • Littering and general pollution <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> • Loss of habitat • Increased alien invasive species <p>Cumulative Impacts – Construction Phase and Negative:</p> <ul style="list-style-type: none"> • Loss of habitat and vegetation 	<p>should be avoided, as recommended by the Aquatic specialist.</p> <ul style="list-style-type: none"> ▪ No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the high sensitivity areas. ▪ Where the approved layout designs impact on individuals, permit applications are required for either the relocation or destruction of provincially protected species (Northern Cape Nature Conservation Act No.9 of 2009) and for protected trees in terms of the National Forests Act No. 84 of 1998. ▪ Alien invasive species establishment and spreading should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with such plants. ▪ Utilise existing access routes as far as possible. Confine the movement of vehicles to the access routes to and from the site and to the construction areas. ▪ Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. ▪ Monitor the entire site for signs of erosion. ▪ General good housekeeping in terms of spills, refuelling and waste management. These have been included in the Environmental Management Programme. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ The loss of species composition and diversity cannot be mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation. ▪ Implement appropriate rehabilitation measures to restore each habitat to a natural state that is representative of the respective vegetation type after construction. ▪ Follow an alien and invasive species control and monitoring plan. ▪ General good housekeeping in terms of spills, refuelling and waste management. These have been included in the Environmental Management Programme. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided. ▪ Rehabilitation and alien invasive management as per the construction and operational phase.
<p>Chapter 8: Aquatic Biodiversity</p>	<p><u>Negative Direct Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Disturbance of aquatic habitat and impact on aquatic biota; ▪ Removal of indigenous aquatic vegetation and associated loss of aquatic ecological integrity and functionality; 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Ensure the final layout of the PV facility and associated infrastructure avoids watercourses and recommended buffers as far as possible; utilisation should be made of existing disturbed areas where possible. The medium sensitivity aquatic habitats should be avoided in the layout design, with only low-sensitivity habitats being disturbed during construction. Note that this has

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	<ul style="list-style-type: none"> ▪ Water supply for construction and stress on available water resources; ▪ Road crossing structures may impede flow in the aquatic features; ▪ Alien vegetation infestation within the aquatic features due to disturbance; and ▪ Increased sedimentation and contamination of surface water runoff may result from construction activities. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Ongoing disturbance of aquatic features and associated vegetation along access roads or adjacent to the infrastructure that needs to be maintained; ▪ Modified runoff characteristics from hardened surfaces has the potential to result in erosion of adjacent watercourses; and ▪ Water supply and water quality impacts (e.g. contamination from sewage) as a result of the operation of the proposed Solar Facility and associated infrastructure. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Increased disturbance of aquatic habitat due to the increased activity; and ▪ Increased sedimentation and contamination of surface water runoff. <p><u>Negative Cumulative Impacts:</u></p> <p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Increased disturbance of aquatic habitat due to the increased activity in the wider area. <p>Operational Phases:</p> <ul style="list-style-type: none"> ▪ Degradation of ecological condition of aquatic ecosystems 	<p>been achieved in the EIA Phase, whereby the recommended development setbacks (i.e. recommended buffer of at least 35 m for the smaller drainage features; and setback from the wider floodplain adjacent to the larger rivers) have been adopted in the identification of the development footprints. The recommended avoidance areas have been avoided.</p> <ul style="list-style-type: none"> ▪ Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. ▪ Rehabilitate disturbed aquatic habitats by revegetating them with suitable local indigenous vegetation. ▪ Water use for construction should be minimised as much as possible. The water should be obtained from an existing water allocation or other viable water sources for construction purposes. ▪ The road crossing structures should be designed to not impede flow in watercourses - low water crossing is preferred. Use existing crossings, as best as possible and where allowable. ▪ The existing road infrastructure, particularly within the floodplain, should be utilised as far as possible to access new infrastructure to minimise the overall disturbance. It is recommended that any new linear type of infrastructure crossings over watercourses be placed where there are existing structures or road crossings within the watercourse corridors, where possible. ▪ Undertake monitoring for the growth of alien vegetation. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Implement avoidance setbacks as recommended above the for the construction phase. ▪ Develop a stormwater management plan for the proposed development that addresses the stormwater runoff from the developed areas. ▪ Stormwater run-off infrastructure must be designed to mitigate both the flow and water quality impacts of any stormwater leaving the developed areas. The runoff should rather be dissipated over a broad area covered by natural vegetation or managed using appropriate shaping of the road with berms or channels and swales adjacent to hardened surfaces where necessary. Should any erosion features develop, they should be stabilised immediately. ▪ Sewage generated within the site should be discharged to a conservancy tank that is properly serviced and regularly evacuated to nearby wastewater treatment works. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Minimise works within aquatic ecosystems. If the project layout avoided these areas, the decommissioning works would also be able to avoid aquatic habitats as delineated. Note that all aquatic areas recommended for avoidance have been avoided in the EIA phase layout identification.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
		<ul style="list-style-type: none"> ▪ Rehabilitate and revegetate disturbed areas, where required. ▪ Decommissioning activities within aquatic features should be undertaken in the dry season where possible.
<p>Chapter 9: Avifauna Assessment</p>	<p><u>Negative Direct Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Displacement due to disturbance associated with the construction of the solar PV plant and associated infrastructure. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Displacement due to habitat transformation associated with the presence of the solar PV plant and associated infrastructure. ▪ Collisions with the solar panels. ▪ Entrapment in perimeter fences. ▪ Electrocutions in the onsite substation complex. ▪ Electrocution of priority species on the internal 33kV powerlines. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Displacement due to disturbance associated with the decommissioning of the solar PV plant and associated infrastructure. <p><u>Negative Cumulative Impacts:</u></p> <p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Displacement due to disturbance associated with the construction and decommissioning of the solar PV plants and associated infrastructure. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Displacement due to habitat transformation associated with the presence of the solar PV plants and associated infrastructure. ▪ Collisions with the solar panels. ▪ Entrapment in perimeter fences. ▪ Electrocutions in the onsite substation complexes. ▪ Electrocution of priority species on the internal 33kV powerlines. 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Activity should as far as possible be restricted to the footprint of the infrastructure. ▪ Measures to control noise and dust should be applied according to best practice in the industry at the time. ▪ Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum as far as practical. ▪ Access to the rest of the property must be restricted. ▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the construction footprint is concerned. ▪ A 1km all infrastructure exclusion zone around the Verreaux's Eagle nest at -30.227660° 24.329773° must be implemented to provide unhindered access to the nest. The development footprint assessed in this report does not infringe on this buffer. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ The recommendations of the botanical specialist must be strictly implemented, especially as far as limiting the vegetation clearance to what is absolutely necessary, and rehabilitation of transformed areas are concerned. ▪ Where possible, surface water (pans, dams and water troughs) must be buffered by a minimum of 50m to ensure unhindered access of priority species to the water. No PV panels should be constructed in this zone. Note that some of the waterpoints in the development footprint will be removed, however, since the minimum circular solar panel exclusion zone of 50m will be applied, the removal of some of the waterpoints will therefore not be a significant impact. ▪ A single perimeter fence should be used. ▪ The hardware within the proposed substation yard is too complex to warrant any mitigation for electrocution at this stage. It is recommended that if on-going impacts are recorded once operational, site-specific mitigation (insulation) be applied reactively. This is an acceptable approach because Red List priority species are unlikely to frequent the substation and be electrocuted. ▪ Use underground cabling as far as possible. Where the use overhead lines are unavoidable due to technical constraints, a bird-friendly pole design must be used. The avifaunal specialist must sign off on the pole design. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Activity should as far as possible be restricted to the footprint of the infrastructure.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
		<ul style="list-style-type: none"> ▪ Measures to control noise and dust should be applied according to best practice in the industry at the time. ▪ Maximum use should be made of existing access roads during the decommissioning phase and the construction of new roads should be kept to a minimum as far as practical. ▪ The recommendations of the ecological and botanical specialist studies must be strictly implemented, especially as far as limitation of the activity footprint is concerned.
<p>Chapter 10: Visual Impact Assessment</p>	<p><u>Negative Direct Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area. ▪ Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Potential visual intrusion of solar arrays and related infrastructure on receptors including glint and glare. ▪ Potential visual impact of an industrial type activity on the pastoral / rural character and sense of place of the area. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Potential visual effect of any remaining structures, platforms and disused roads on the landscape. <p><u>Negative Cumulative Impacts:</u></p> <p>Construction, Operational and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Potential combined visual effect of the proposed 12 solar PV facilities in the study area, seen together with other existing and proposed renewable energy facilities in the area, and could potentially increase the overall cumulative visual impact. 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Locate construction camps, batching plants and stockpiles in visually unobtrusive areas, away from public roads. ▪ Implement EMPr with ECO during construction. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Substation and BESS to be located in an unobtrusive low-lying area, away from public roads. ▪ Muted natural colours and non-reflective finishes to be used for structures generally. ▪ Internal access roads to be as narrow as possible, and existing roads or tracks used as far as possible. ▪ Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. ▪ Internal powerlines (i.e. 22 kV or 33 kV) to be located underground where possible. (In some cases, such as stream crossings, internal powerlines may need to be above ground). ▪ Outdoor signage to be discrete and commercial / billboard signage avoided. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Solar arrays and infra-structure to be removed and recycled. ▪ Access roads no longer required to be ripped and regraded. ▪ Exposed or disturbed areas to be revegetated to blend with the surroundings.
<p>Chapter 11: Heritage Impact Assessment (Archaeology and Cultural Landscape)</p>	<p><u>Negative Direct Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Potential impacts to archaeology; ▪ Potential impacts to graves; and ▪ Potential impacts to the cultural landscape. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Potential impacts to the cultural landscape. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Potential impacts to the cultural landscape. 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Report any chance finds of dense clusters of artefacts to SAHRA and/or an archaeologist. Protect in situ and appoint archaeologist to sample as needed. ▪ Report any chance finds of graves to SAHRA and/or an archaeologist. Protect in situ and appoint archaeologist to exhume. ▪ Minimise the duration of construction period. ▪ Ensure effective rehabilitation, at the end of the construction period, of areas not needed during operation.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	<p><u>Negative Cumulative Impacts:</u></p> <p>Construction, Operational and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Potential impacts to the cultural landscape. <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Potential impacts to archaeology; and ▪ Potential impacts to graves. 	<p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Ensure that all maintenance vehicles and operational activities stay within designated areas. ▪ Paint buildings in earthy colours to reduce contrast. ▪ Make use of motion detectors and downlighting to reduce night-time light pollution. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Minimise duration of decommissioning period ▪ Ensure effective rehabilitation of the entire site once the infrastructure has been removed.
<p>Chapter 12: Palaeontology Site Sensitivity Verification Report</p>	<ul style="list-style-type: none"> ▪ The study area has been confirmed as low to very low palaeo-sensitivity. Provided that the Chance Fossil Finds Protocol is incorporated into the EMPs and fully implemented during the construction phase of the solar PV facility, there are no objections on palaeontological heritage grounds to authorisation of the proposed project. Pending the discovery of significant new fossil finds before or during construction, no further specialist palaeontological studies, reporting, monitoring or mitigation are recommended for the proposed project. 	<ul style="list-style-type: none"> ▪ The Chance Fossil Finds Protocol has been incorporated into the project EMPs (Appendix I and Appendix J of this EIA Report).
<p>Chapter 13: Socio- Economic Assessment</p>	<p><u>Direct Negative Impacts</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Impacts associated with the presence of construction workers on local communities. ▪ Impacts related to the potential influx of job seekers. ▪ Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site. ▪ Increased risk of grass fires associated with construction related activities; ▪ Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles. ▪ Impact on productive farmland. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Visual impacts and associated impacts on sense of place. ▪ Potential impact on property values. ▪ Potential impact on tourism. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Social Impacts associated with retrenchment, including loss of jobs and source of income. <p><u>Direct Positive Impacts</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Creation of employment and business opportunities, and opportunity for skills development and on-site training. <p>Operational Phase:</p>	<p>Note that several mitigation and enhancement measures have been identified in the assessment. The list below is only a summary of some of the recommendations.</p> <p>Positive Impacts – Enhancement Measures:</p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. ▪ Where feasible, efforts should be made to employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. ▪ Before the construction phase commences the proponent should meet with representatives from the Renosterberg Local Municipality (RLM) and the Emthanjeni Local Municipality (ELM) to establish the existence of a skills database for the area. If such a database exists, it should be made available to the contractors appointed for the construction phase. ▪ The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project. ▪ Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. ▪ The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	<ul style="list-style-type: none"> ▪ Establishment of infrastructure to improve energy security and support renewable sector. ▪ Creation of employment opportunities. ▪ Benefits associated with socio-economic contributions to community development. ▪ Benefits for local landowners. <p><u>Cumulative impacts:</u></p> <ul style="list-style-type: none"> ▪ Negative: Cumulative impacts on sense of place ▪ Negative: Cumulative impact on local services and accommodation ▪ Positive: Cumulative impact on local economy. 	<ul style="list-style-type: none"> ▪ The proponent and contractor should develop a Code of Conduct (CoC) for construction workers. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. The CoC should be signed by the proponent and the contractors before the contractors move onto site. The CoC should form part of the CHSSP. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Maximise the number of employment opportunities for local community members. ▪ Implement training and skills development programs for members from the local community. ▪ Maximise opportunities for local content and procurement. ▪ Implement agreements with affected landowners on which the PV facility will be constructed. <p>Negative Impacts – Mitigation Measures:</p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. ▪ Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. ▪ All farm gates must be closed after passing through. ▪ Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. ▪ Timing of construction activities should be planned to avoid / minimise impact on key farming activities. ▪ All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ The recommendations of the Visual Impact Assessment should be implemented. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. ▪ All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.
<p>Chapter 14: Traffic Impact Assessment</p>	<p><u>Direct Negative Impacts</u></p> <p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Potential congestion and delays on the surrounding road network. ▪ Potential impact on traffic safety and increase in accidents with other vehicles or animals. 	<p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Stagger delivery trips and schedule trips, including staff trips outside of peak hours where possible. ▪ Implement speed control by means of a stop and go system and speed limit road signage within the construction and decommissioning site.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	<ul style="list-style-type: none"> ▪ Potential change in the quality of the surface condition of the roads. ▪ Potential noise and dust pollution. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ The traffic generated during the operational phase are mainly related to the staff that will be transported to and from the sites and are not anticipated to have a significant traffic impact on the surrounding road network. <p><u>Cumulative Negative Impacts</u></p> <p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Potential congestion and delays on the surrounding road network. ▪ Potential impact on traffic safety and increase in accidents with other vehicles or animals. ▪ Potential change in the quality of the surface condition of the roads. ▪ Potential noise and dust pollution. 	<ul style="list-style-type: none"> ▪ Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator. ▪ Regular maintenance of internal farm access roads by the contractor. ▪ Ensure private access roads that are impacted on by the proposed development are restored to original pre-construction road condition. ▪ Implement dust control on gravel roads within the construction and decommissioning site.
<p>Chapter 15: Battery Energy Storage System High Level Safety, Health and Environment Risk Assessment</p>	<p>Various risks were identified in terms of safety, health and the environment due to the proposed BESS. The BESS High Level Safety, Health and Environment Risk Assessment identified risks, hazards, and consequences, such as, but not limited to:</p> <ul style="list-style-type: none"> ▪ Human Health - chronic exposure to toxic chemical or biological agents. Causes - Construction materials such as cement, paints, solvents, welding fumes, truck fumes etc. Consequences - Employee / contractor illness. ▪ Human Health - exposure to noise. Causes - Drilling, piling, generators, air compressors. Consequences - Adverse impact on hearing of workers. Possible nuisance factor in nearby areas. ▪ Human and Equipment Safety - exposure to fire radiation Causes – ▪ Involvement in an external fire. Fire involving fuels used in construction vehicles or vehicles themselves (e.g., tyre fire). Fire due to uncontrolled welding or other hot-work. Consequences - Injuries due to radiation especially amongst first responders and bystanders. Fatalities unlikely from the heat radiation as not highly flammable nor massive fire. ▪ Human and Equipment Safety - exposure to explosion over pressures. Transformer shorting / overheating / explosion. Consequences - Potential fatalities, e.g., amongst first responders. Damage to nearby equipment. 	<ul style="list-style-type: none"> ▪ There are numerous different battery technologies but using one consistent battery technology system for the BESS installations associated with all the proposed Kudu Solar Facilities would allow for ease of training, maintenance, emergency response and could significantly reduce risks. ▪ Where reasonably practicable, state-of-the-art battery technology should be used with all the necessary protective features e.g., draining of cells during shutdown and standby-mode, full Battery Management System (BMS) with deviation monitoring and trips, leak detection systems. ▪ Ensure that the technical and system suggestions for reducing risks, as specified in the assessment, specifically in terms of preventative and mitigative measures are included in the design. ▪ The overall design should be subject to a full Hazard and Operability Study (HAZOP) prior to finalisation of the design. ▪ For Redox Flow systems, an end of life (and for possible periodic purging requirements) solution for the large quantities of hazardous electrolyte should be investigated, e.g., can it be returned to the supplier for re-conditioning. ▪ Prior to importing any solid-state battery containers into the country, the contractor should ensure that: <ul style="list-style-type: none"> ○ An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan needs to include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating. ○ An End-of-Life Plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers. ▪ The site layout and spacing between lithium solid-state containers should be such that it mitigates the

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
		<p>risk of a fire or explosion event spreading from one container to another.</p> <ul style="list-style-type: none"> ▪ In order to limit the possibility of domino failures the BESS should be separated from the substation by at least 20 m. ▪ Where there is a choice of alternative locations for the BESS, those that are further from water courses would be preferred. Redox Flow BESS hazards are mostly related to possible loss of containment of electrolyte and solid-state systems may experience fires that may result in loss of containment of liquids or the use of large amounts of fire water which could be contaminated. The run-off should not enter water courses directly. ▪ Finally, it is suggested once the BESS technology has been chosen and more details of the final design are available, the necessary updated Risk Assessments should be in place (prior to commencement, after EA and other necessary approvals are granted (should such be granted)).
<p>Chapter 16: Geohydrology Assessment</p>	<p><u>Direct Negative Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Potential lowering of the groundwater level from construction requirements; ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Potential lowering of the groundwater level from operational requirements. ▪ Potential impact of groundwater quality as a result of using cleaning agents for cleaning the solar panels. ▪ Groundwater quality deterioration as a result of electrolyte that will be used for the BESS. <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages. ▪ Potential lowering of the groundwater level from decommissioning requirements. <p><u>Cumulative Negative Impacts:</u></p> <ul style="list-style-type: none"> ▪ Potential lowering of groundwater level during the construction, operational and decommissioning phase for all 12 of the Kudu PV facilities. ▪ Potential impact on groundwater quality as a result of accidental oil spillages or fuel leakages from the construction and the decommissioning phase for all 12 Kudu facilities. ▪ Potential of impact on groundwater quality as a result of using cleaning agents for cleaning 	<p>Construction and Decommissioning Phases:</p> <ul style="list-style-type: none"> ▪ Adhere to the borehole's safe yield and to monitor water levels and flow. ▪ Boreholes must be correctly yield tested according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This includes a Step Test, Constant Discharge Test and recovery monitoring. ▪ Vehicles must be regularly serviced and maintained to check and ensure there are no leakages. ▪ Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. ▪ Vehicles and equipment should also be refuelled on an impermeable surface. A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible. If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Borehole's safe yield, monitoring and yield testing as per the construction phase. ▪ Use environmentally safe cleaning agents that breakdown naturally and do not cause adverse effects. ▪ Ensure that all electrolyte or chemicals stored or used on site have secondary containment systems in place with reliable leak detection, annunciation in place. Ensure that all chemicals are handled on concrete bunded surfaces and not on bare soil. ▪ Wastewater produced by fire hydrants should not be allowed to runoff into the environment. ▪ It is recommended that all BESS's are placed a minimum of 50m from any borehole.

Specialist Assessment undertaken	Key Impacts Identified	Recommended Mitigation Measures
	<p>the solar panels during the operational phase for all the 12 Kudu facilities.</p> <ul style="list-style-type: none"> ▪ Potential impact on groundwater quality as a result of electrolyte that will be used for the BESS. ▪ Other wind and solar, and EGI projects within a 30 km radius. 	
<p>Chapter 17: Geotechnical Assessment</p>	<p><u>Direct and Cumulative Negative Impacts:</u></p> <p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Displacement of geologic materials. ▪ Contamination of geologic materials as a consequence of the construction activities. <p>Operational and Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Increased unnatural hard surfaces. ▪ Contamination of geologic materials as a consequence of typical maintenance and decommissioning activities. 	<p>Construction Phase:</p> <ul style="list-style-type: none"> ▪ Favour dolerite as an aggregate (as opposed to Karoo sandstones and mudstones). Subject to investigation. ▪ Any road cuttings should be designed by an appropriately qualified professional. ▪ Drainage in the region should be designed and managed appropriately. ▪ Investigate and confirm the geotechnical suitability of each structure (or other appropriate level of investigation) prior to construction (i.e., determine that soil with an adequate bearing capacity is obtained beneath each footing). Such investigations would not be required to fulfil the requirements of this EIA process. However, it would be necessary prior to construction. ▪ Only strip vegetation necessary for the next phase of construction. ▪ Install temporary drainage to divert stormwater away from active construction activities, where required. ▪ Where impacted through construction-related activities, all sloped areas must be stabilised to ensure proper rehabilitation is affected and erosion is controlled. <p>Operational Phase:</p> <ul style="list-style-type: none"> ▪ Install drainage to divert stormwater away from activities, roads/tracks, structures, where required. ▪ During the execution of the operations, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; <p>Decommissioning Phase:</p> <ul style="list-style-type: none"> ▪ Land rehabilitation to near natural state, i.e., removal of foundations and backfilling of any resultant voids within the soil, as well as removal of hard surfaced areas. Replacement soil should be sourced locally to ensure homogeneity. ▪ Reinstate natural topography where cut-to-fill embankments have been constructed.

SUMMARY OF KEY IMPACT ASSESSMENT FINDINGS

Based on the findings of the detailed specialist impact assessments, which are included in Chapter 6 to 17 of this EIA Report, the proposed project is considered to have an **overall Moderate to Very Low negative environmental impact** and an **overall High to Moderate positive socio-economic impact** (with the implementation of respective mitigation and enhancement measures). Table E below provides a summary of the impact assessment for the proposed project post mitigation for direct impacts. Table F provides the same information for the cumulative impacts.

As indicated in Table E, the direct negative impacts were rated with an overall **Low to Very Low** post-mitigation impact significance for the **construction phase**, with only Terrestrial Biodiversity impacts being rated as Moderate. In terms of the **operational and decommissioning phases**, the majority of the direct negative impacts were rated with a **Low to Very Low** post-mitigation impact significance. In terms of direct positive impacts, the Socio-Economic impacts are rated as having a **Moderate** impact significance post-mitigation for the construction phase; and **Moderate to High** impact significance post-mitigation for the operational phase.

Based on Table F, the majority of the cumulative negative impacts were rated with a **Low** post-mitigation impact significance for the **construction phase**, with the exception of Terrestrial and Socio-Economic impacts, which were respectively rated with a Moderate and Moderate to Low post-mitigation impact significance. A similar trend is applicable to the **operational phase**, with Visual and Avifauna impacts being rated as **Moderate**; and Socio-Economic impacts being rated as **Moderate to Low**.

During the **decommissioning phase**, the majority of cumulative impacts were rated with a **Low to Very Low** post-mitigation impact significance, whereas some were not identified, or are considered insignificant, or could not be measured empirically at the time of assessment. In terms of cumulative positive impacts, the Socio-Economic impacts were rated with an overall **Moderate** post-mitigation impact significance.

Table E: Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts.

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
DIRECT NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Moderate		Low		Low	
Aquatic Biodiversity	Very Low		Very Low		Very Low	
Avifauna	Low		Very Low	Low	Low	
Visual	Low		Low		Very Low	
Heritage (Archaeology and Cultural Landscape)	Low		Low		Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Socio-Economic	Low		Low		Low	
Traffic	Low	Very Low	Insignificant		Low	Very Low
Geohydrology	Low	Very Low	Low	Very Low	Very Low	
Geotechnical	Very Low		Very Low		Very Low	
DIRECT POSITIVE IMPACTS						
Socio-Economic	Moderate		Moderate	High	Insignificant and/or not identified and/or not applicable	

Table F: Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts.

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
CUMULATIVE NEGATIVE IMPACTS						
Agriculture and Soils	Low		Low		Low	
Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species	Moderate		Low		Low	
Aquatic Biodiversity	Very Low		Very Low		Very Low	
Avifauna	Low		Moderate		Low	
Visual	Low		Moderate		Very Low	

Specialist Assessment	Construction Phase		Operational Phase		Decommissioning Phase	
Heritage (Archaeology and Cultural Landscape)	Low		Low		Low	
Palaeontology	Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable		Insignificant and/or not identified and/or not applicable	
Socio-Economic	Low	Moderate	Low	Moderate	Insignificant and/or not identified and/or not applicable	
Traffic	Low		Insignificant		Low	Very Low
Geohydrology	Low	Very Low	Low	Very Low	Very Low	
Geotechnical	Low		Low		Low	
CUMULATIVE POSITIVE IMPACTS						
Socio-Economic	Moderate		Moderate		Moderate	

OVERALL ENVIRONMENTAL IMPACT ASSESSMENT AND REASONED OPINION FROM THE EAP

The information presented above, contributes to this overall environmental impact statement and reasoned opinion from the EAP as to whether the proposed project should or should not be authorised, including any conditions that should be made in respect of the authorisation (should it be granted).

Based on the findings of the detailed specialist assessments and technical studies, which all recommend that the proposed project can proceed and should be authorised by the DFFE, the proposed project is considered to have an **overall Moderate to Very Low negative environmental impact, and an overall Moderate to High positive socio-economic impact** (with the implementation of respective mitigation and enhancement measures).

The proposed project will take place within the development footprint on the preferred and approved project site, as contemplated in the accepted Final Scoping Report. The development footprint and buildable areas will avoid the “no-go” sensitive features identified and mapped by the respective specialists, where relevant and applicable.

This EIA has considered the nature, scale and location of the development as well as the wise use of land. The need for new solar PV generation capacity is specified in the energy planning for the country. The proposed project will therefore assist in generating additional electricity that is urgently required to address the shortage of generation capacity in the country.

The proposed project will be in line with the objective of the PKSDM IDP in terms of creating more job opportunities. The proposed Solar PV Facility will assist in local job creation during the construction and operational phases of the project (if approved by the DFFE). It should be noted that employment during the construction phase will be temporary and provided for a period of 12 to 18 months.

Section 24 of the Constitutional Act states that “*everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*”. Based on this, this EIA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures, and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans (refer to the EMP in Appendix I and Appendix J of this EIA Report).

The outcomes of this project therefore succeed in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site. The findings of this EIA show that all natural resources will be used in a sustainable manner (i.e., this project is a renewable energy project, and the majority of the negative site specific and cumulative environmental impacts are considered to be of low significance with mitigation measures implemented), while the benefits from the project will promote justifiable economic and social development. Furthermore, additional specialist studies (not recommended by the Screening Tool) have been undertaken as part of the EIA Process to ensure that all potential environmental impacts are addressed and assessed.

Provided that the specified mitigation measures and management actions are applied effectively throughout, it is recommended that the proposed project receive EA in terms of the 2014 NEMA EIA Regulations (as amended), promulgated under the NEMA. It is recommended that the **EA be valid for a period of 10 years**. It is understood that the information contained in this EIA Report and appendices is sufficient to make a decision in respect of the activity applied for.



CHAPTER I: Introduction



CONTENTS

1. INTRODUCTION	1-3
1.1. Overview of the Proposed Kudu Solar Facility 1	1-6
1.2. Project Motivation	1-6
1.3. Legal Requirements for an EIA	1-9
1.4. Background on ABO Wind	1-9
1.5. Project Applicant	1-10
1.6. Competent Authority and EIA Project Team	1-10
1.7. Details and Expertise of the CSIR EIA Project Management Team	1-12
1.8. Need and Desirability	1-13
1.9. Objectives for this EIA Report	1-37

TABLES

Table 1.1: The EIA Project Team	1-11
Table 1.2: The Guideline on the Need and Desirability's list of questions to determine the "Need and Desirability" of a proposed project	1-14
Table 1.3: Compliance with Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	1-38



FIGURES

- Figure 1.1: Breakdown of the projects that comprise the Kudu Solar Facilities and EGI cluster _____ 1-4
- Figure 1.2: Locality map for the proposed Kudu Solar Facilities 1 to 12 and EGI near De Aar in the Northern Cape. Note that the EGI Projects are not part of the current application and report. The EGI Projects will be considered separately at a later stage. The EGI corridor indicated in this Figure is indicative. _____ 1-5

1. INTRODUCTION

The Project Developer, Kudu Solar Facility 1 (Pty) Ltd (hereafter “Project Applicant” or “Project Developer”) is proposing to develop a Solar Photovoltaic (PV) power generation facility and associated Electrical Grid Infrastructure (EGI), north-east of the town of De Aar in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province. The proposed project is located approximately 50 km from De Aar and 25 km from Petrusville. A total of 12¹ Solar PV Facilities are being proposed. Each project will have a specific Project Applicant. The proposed projects are referred to as the “Kudu project”.

ABO Wind renewable energies (Pty) Ltd (hereafter “ABO Wind”) is involved in the development proposal stage, however, the responsibility for the actual implementation of the project (should Environmental Authorisation (EA) and relevant approvals be granted) lies with the Project Developer / Project Applicant (i.e. Kudu Solar Facility 1 (Pty) Ltd).

The proposed Solar PV Facilities will make use of PV solar technology to generate electricity from energy derived from the sun. Each solar PV Facility will have a range of associated infrastructure, including, but not limited to, an on-site substation complex, battery energy storage system (BESS), and is proposed to connect to the existing Hydra-Perseus 400 kV overhead power line via dedicated proposed 132 kV power lines, an independent Main Transmission Substation (MTS), and a 400 kV Loop-In-Loop-Out (LILO).

Each of the Solar PV Facilities would be its own project and would require its own, separate EA. The same applies to the EGI projects. The following projects are being proposed (Figure 1.1):

- **PROJECTS 1 TO 12:** The proposed development of 12 Solar PV Facilities and associated infrastructure (i.e. Kudu Solar Facility 1 to Kudu Solar Facility 12²).
- **PROJECTS 13 TO 24:** The proposed development of switching stations and collector stations at each on-site substation complex at each of the 12 Kudu Solar Facilities, and up to 12 x 132 kV overhead power lines running from each Solar PV Facility to the proposed collector stations or up to the proposed MTS.
- **PROJECT 25:** The proposed development of an independent 400/132 kV MTS, including associated infrastructure at the MTS.
- **PROJECT 26:** The proposed development of a 400 kV LILO from the existing Hydra-Perseus 400 kV overhead power line to the proposed MTS.

Projects 1 to 12 require Scoping and Environmental Impact Assessment (EIA) Processes. Projects 13 to 26 will require Basic Assessment (BA) Processes or will be subjected to separate registration processes in terms of the EGI Standard (Government Gazette (GG) 47095; Government Notice (GN) 2313, dated 27 July 2022), or may require a hybrid approach depending on the sensitivities found within the EGI corridor. With specific reference to Projects 25 and 26, if the proposed Eskom

¹ Initially, the Project Developer identified the Original Scoping Buildable Areas within the study area, and these contained up to 14 Solar PV Facilities (as noted in the Background Information Document). Following the identification of sensitivities during the Scoping Phase, as well as various considerations such as the capacities of the Bidding Window 6 and the requirements of landowners, the Project Developer took such sensitivities and considerations into account and formulated the Revised Scoping Buildable Areas, which resulted in up to 12 Solar PV Facilities.

² Note that throughout the report the term Solar Facility and PV are used synonymously. For example, Kudu Solar Facility 1 and Kudu PV 1 are used interchangeably.

Hydra B Substation is built by Eskom, then additional upgrades of this Eskom substation would be undertaken to ensure that the substation can accommodate the power generated by the proposed 12 Kudu Solar Facilities. This would be undertaken based on engagements with and approval from Eskom. Additional detail will be provided as the separate BA or registration processes progress.

Scoping and EIA Processes x 12		BA Processes x 12 or Standard Registration Processes x 12 or hybrid approach		
Project 1: Kudu Solar Facility 1	Project 7: Kudu Solar Facility 7	Project 13: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 1	Project 19: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 7	Project 25: Independent 400/132 kV MTS and associated infrastructure
Project 2: Kudu Solar Facility 2	Project 8: Kudu Solar Facility 8	Project 14: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 2	Project 20: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 8	Project 26: 400 kV Loop-In-Loop-Out (LILO) from the existing Hydra-Perseus 400 kV line to the proposed MTS
Project 3: Kudu Solar Facility 3	Project 9: Kudu Solar Facility 9	Project 15: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 3	Project 21: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 9	
Project 4: Kudu Solar Facility 4	Project 10: Kudu Solar Facility 10	Project 16: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 4	Project 22: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 10	
Project 5: Kudu Solar Facility 5	Project 11: Kudu Solar Facility 11	Project 17: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 5	Project 23: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 11	
Project 6: Kudu Solar Facility 6	Project 12: Kudu Solar Facility 12	Project 18: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 6	Project 24: Switching Station, Collector Station, 132 kV Power Line for Kudu Solar 12	

Figure 1.1: Breakdown of the projects that comprise the Kudu Solar Facilities and EGI cluster.

This EIA Report only addresses **Kudu Solar Facility 1** (i.e. Project 1) (hereafter referred to as the “Kudu Solar Facility” or “proposed project”), and separate reports have been compiled for each of the Solar PV Facilities (i.e. Projects 1 to 12). Separate reporting will also be followed for Projects 13 to 26 based on the relevant environmental management instrument implemented at the time. Therefore, the EGI Projects (Projects 13 to 26) are not the subject of this current EIA Process.

In terms of reporting, note that a request to submit combined Applications for EA in terms of Regulation 11 (4) of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended) and the issuing of multiple EAs in terms of Regulation 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended) was not accepted by the Department of Forestry, Fisheries and the Environment (DFFE). Refer to Appendix D.6 of this EIA Report for a copy of this correspondence from the DFFE.

This chapter provides an introduction of the proposed project, and includes the following:

- An overview of the proposed Solar PV Facility and associated infrastructure;
- Project Motivation;
- The legal requirements for an EIA;
- Information on the Project Developer and Project Applicant;
- The Competent Authority and EIA Project Team;
- Details and Expertise of the CSIR EIA Project Management Team;
- Need and Desirability;
- The objectives of the EIA Report; and
- Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended).

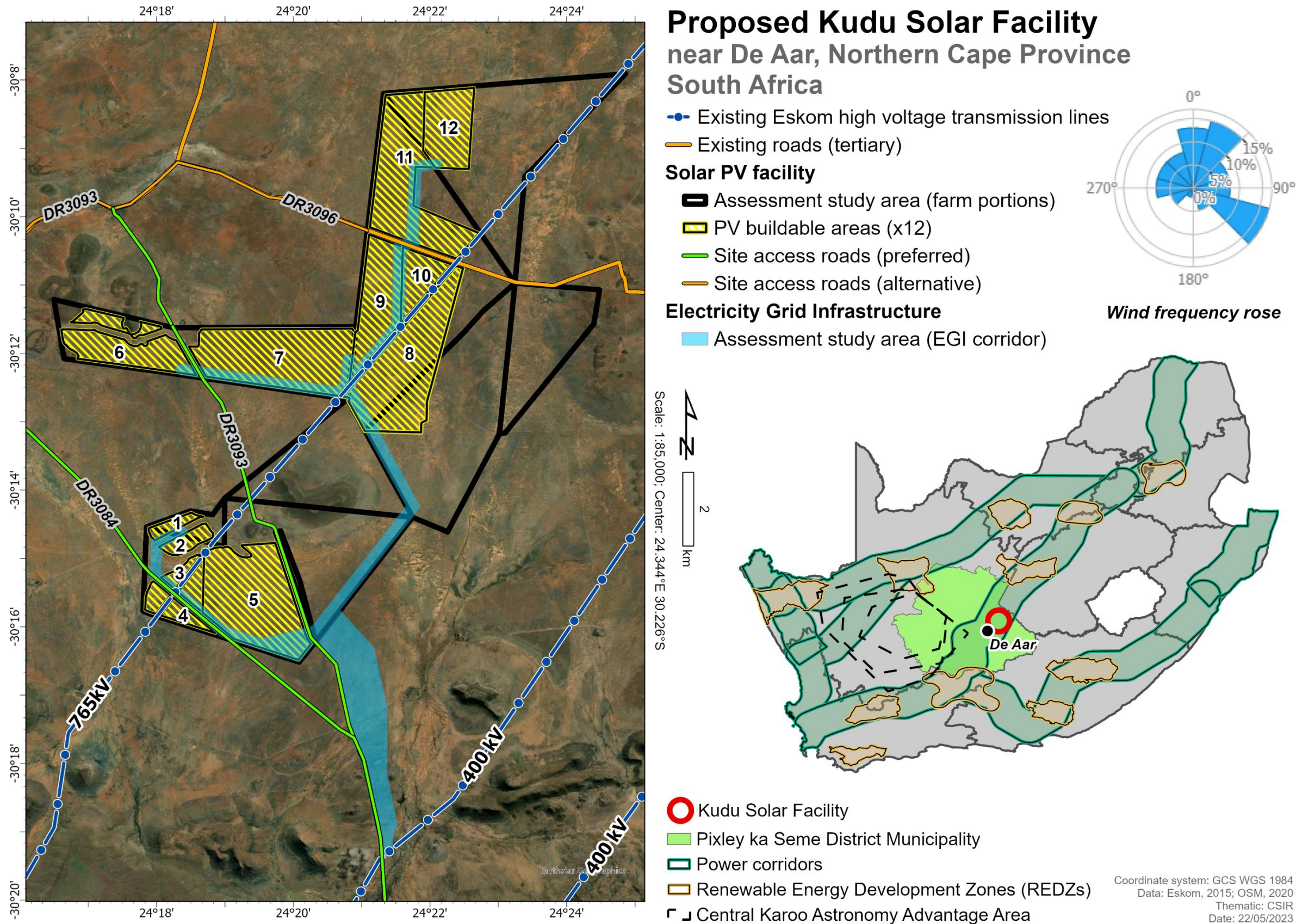


Figure 1.2: Locality map for the proposed Kudu Solar Facilities 1 to 12 and EGI near De Aar in the Northern Cape. Note that the EGI Projects are not part of the current application and report. The EGI Projects will be considered separately at a later stage. The EGI corridor indicated in this Figure is indicative.

1.1. Overview of the Proposed Kudu Solar Facility 1

The proposed Solar PV Facility will consist of the key components listed in Chapter 2 of this EIA Report, as summarised below:

- Solar Field, comprising Solar Arrays with a maximum height of approximately 3.5 m.
- Building Infrastructure (e.g. on-site substation complex; offices; operational and maintenance building and control centre; warehouse/workshop; ablution facilities; Inverter-Transformer stations; and guard house).
- An on-site substation complex including the following:
 - On-site Independent Power Producer (IPP) or Facility Substation.
 - Solid State Lithium Ion or Redox Flow BESS³.
 - Switching Station and Collector Station. This forms part of Projects 13 – 24 and will be assessed as part of separate processes. It is important to mention here for contextualisation (it does not appear in the Application for EA or relevant listed activities).
- Associated Infrastructure (e.g. temporary construction laydown area; internal roads up to 8 m wide; upgrading of existing access roads (where required); fencing; storm water channels; panel maintenance and cleaning area; underground low voltage cables or cable trays; and 22 or 33 kV internal underground power lines⁴).

The generation capacity for Kudu Solar Facility 1 is estimated at 50 Megawatts alternating current (MWac). The construction period is estimated to extend 12 to 18 months. Once the commercial operation date is achieved, the proposed facilities will generate electricity for a minimum period of 20 years.

1.2. Project Motivation

The need for renewable energy is clear, in both a local and international context, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation. South Africa is one of the highest per capita producers of carbon emissions in the world. These emissions are largely a result of an energy-intensive economy and high dependence on coal-based electricity generation to meet more than 90% of its energy needs. Consequently, the South African government is committed to supplementing the existing generation capacity of thermal and nuclear power plants with renewable energy power generation, thus creating the framework that will lead to an increase in the supply of clean energy for the nation. The development of renewable energy is important for South Africa to reduce its overall environmental

³ Both technologies were both options have been considered in the Scoping and EIA Process and deemed acceptable by the Environmental Assessment Practitioner (EAP) and specialists. However, the DFFE requested that preferred technology be selected. Therefore, Solid State Lithium Ion BESS is selected as the preferred technology for authorisation. However, should the need to change the technology arise in future, it is understood that an EA amendment process can be followed as both technologies have been assessed as part of the EIA Phase.

⁴ The internal reticulation would be 22 or 33 kV, and most likely underground. In the isolated event of crossing a feature hindering underground cabling (e.g. a road, topographical or environmental constraint) the reticulation line may better be suited to be above ground in certain sections. Therefore, both below and above ground routings need to be covered in this Application for EA. This does not trigger Activity 11 of Listing Notice 1, as the internal reticulation will not have “a capacity of more than 33 kV”. This is also noted in Chapter 2 of the EIA Report.

footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability.

Commitment toward decarbonisation of the economy is clearly illustrated in the South Africa's National Development Plan (NDP) Vision 2030 published in 2012. Chapters 4 and 5 of the NDP advocates for increased investment in an energy sector that is both economically inclusive and environmentally sustainable – with renewable energy at the core of enabling this transition. The plan identifies, as a priority, the production of sufficient energy to support industry at competitive prices, ensuring access for poor households, while reducing the carbon intensity of the economy.

In addition, due to the current constrained energy landscape and frequent loadshedding, the South African Government has articulated a plan to address the energy crisis. The President of South Africa delivered a speech on 25 July 2022 to inform the public of the plan towards achieving a reliable, affordable and sustainable energy supply (The Presidency, 2022⁵). In addition, the Minister of Forestry, Fisheries and the Environment also held a stakeholder engagement session on 21 July 2022 during which she highlighted proposed mechanisms for streamlining environmental approvals for solar energy development in low and medium sensitivity areas throughout the country; as well as power line and substation development within low and medium sensitivity areas within the gazetted EGI corridors (DFFE, 2022⁶). One of those mechanisms has already been gazetted for implementation, as noted above (i.e. the EGI Standard published in GG 47095; GN 2313, dated 27 July 2022).

Further, the Integrated Resource Plan (IRP) for South Africa for the period 2010 to 2030 (referred to as "IRP2010") was released by government in 2010, and an updated report was published in 2013, which proposed to secure 17 800 MW of renewable energy capacity by 2030 (including solar, wind and other energy sources). In August 2011, the Department of Energy (DoE) (currently operating as the Department of Mineral Resources and Energy (DMRE)) launched the Renewable Energy Independent Power Producer Programme (REIPPPP) and invited potential IPPs to submit proposals for the financing, construction, operation and maintenance of the first 3 725 MW of onshore wind, solar thermal, PV, biomass, biogas, landfill gas or small hydropower projects. On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in GN 733, GG 39111. Of this, the additional target allocated for solar PV was 2 200 MW.

The most recent update to the IRP i.e. the IRP 2019, was gazetted by the Minister of Mineral Resources and Energy, Gwede Mantashe, in October 2019. The update revised the energy forecast for South Africa to the year 2030. Provision has been made for new additional capacity by 2030 including in particular 14 400 MW of wind and 6 000 MW of solar PV. In terms of the REIPPPP, submitted proposals are then evaluated according to a Request for Proposal (RFP). Bidding Window 5 had the same two main evaluation criteria for compliant proposals as the previous Bidding Windows 1-4, namely price and economic development. However, for Bidding Window 5, the point allocation changed to 90/10 compared to 70/30 for the previous Bidding Windows.

⁵ The Presidency (2022). *Address by President Cyril Ramaphosa on actions to address the electricity crisis, Union Buildings, Tshwane*. Accessed online: <https://www.thepresidency.gov.za/speeches/address-president-cyril-ramaphosa-actions-address-electricity-crisis%2C-union-buildings%2C-tshwane> [August 2022]

⁶ DFFE (2022). *Minister Creecy announces improved environmental assessment processes for solar energy*. Accessed online: https://www.dffe.gov.za/creecy_environmentalassessmentprocesses_solarenergy [August 2022]

The overview summary document (DMRE, 2022⁷) on the RFP issued for Bidding Window 6 notes that Bid responses will be assessed firstly in terms of Functional and Qualification Criteria to determine if they are compliant. These criteria include the structure of the project; legal aspects; land acquisition and land use; environmental; financial; technical; economic development; and value for money. Secondly, the compliant Bids are proposed to be evaluated on a comparative basis (out of 100 points) in terms of price (maximum of 90 points) and economic development (maximum of 10 points). Therefore, economic development has been retained as a qualification criterion based on the RFP for Bidding Window 5, but it is also considered in the comparative scoring (DMRE, 2022). The bidders whose responses rank the highest (according to the aforementioned criteria) generally have the greatest potential to be appointed as “Preferred Bidders” by the DMRE.

Bidding Window 5 was conducted during 2021 with an allocation of 2 600 MW for new wind and solar energy. The successful bidders were announced on 28 October 2021. Bidding Window 6 was announced in April 2022 with an allocation of 4200 MW of renewable energy of which solar comprises 1000 MW. Six preferred bidders have been selected for Bidding Window 6.

Should this proposed project be acceptable and authorised, it is considered viable that long-term benefits for the community and society in the De Aar area would be realised. The proposed project will provide an opportunity for additional employment in an area where job creation is identified as a key priority. Approximately 150 employment opportunities will be created during the construction phase, and approximately 8 during the operational phase of the proposed project. The proposed project will make use of local labour as much as possible.

The project is intended to address the current energy shortages in South Africa and assist in meeting the need for additional renewable energy generation capacity, as required by the IRP of 2019. The total generation capacity of the entire project (i.e. should all 12 Solar Facilities be authorised) would be in the order of approximately 2 180 MWac. As a means of comparison, for 2022 the municipal area of Kimberley in the Northern Cape has a total electricity load forecast of 643 MW and the total load forecast for the Northern Cape is 897 MW (Eskom, 2021⁸). The total provincial peak load forecast for the Northern Cape is expected to increase to about 1 313 MW by 2031 (Eskom, 2021).

The proposed project would also have international significance as it contributes to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement on Climate Change, Kyoto Protocol, and United Nations Convention on Biological Diversity (UNCBD), all of which South Africa is a signatory to. Renewable energy is critical to South Africa as this source of energy is recognised as a major contributor to climate protection, has a much lower environmental impact significance, as well as advancing economic and social development.

⁷ DMRE (2022). Overview of the Request for Qualification and Proposals for New Generation Capacity under Sixth Bid Submission Phase of the Renewable Energy Independent Power Producer Procurement Programme. Accessed online: <https://www.ipp-renewables.co.za/> [June 2022]

⁸ Eskom (2021). *Transmission Development Plan (2022 – 2031)*. Accessed online: <https://www.eskom.co.za/eskom-divisions/tx/transmission-lines/transmission-development-plans/> [May 2022]

It is intended that this project will be bid into a future bidding program of the REIPPPP [or another future process linked to the IRP]. To submit a Bid in terms of the REIPPPP, the Project Applicant is required to have obtained an EA in terms of the 2014 NEMA EIA Regulations (as amended), as well as several additional authorisations or consents.

1.3. Legal Requirements for an EIA

Section 24(1) of the NEMA, states that “In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant EA”. The reference to “listed activities” relates to the regulations promulgated in GN R982, R983, R984 and R985 in GG 38282, dated 4 December 2014, which came into effect on 8 December 2014. These were amended on 7 April 2017, specifically promulgated in GN R326, R327, R325 and R324 in GG 40772; and further amended on 11 June 2021 in GN 517; and on 3 March 2022 in GN 1816. GN R327 and GN R324 includes listed activities that trigger the need for a BA Process, whereas GN R325 includes listed activities that trigger the need for a full Scoping and EIA Process. Additional detail is provided in Chapter 4 of this EIA Report.

In terms of the NEMA and the 2014 NEMA EIA Regulations (as amended), a full Scoping and EIA Process is required for the proposed project.

The proposed project is not located within any of the Renewable Energy Development Zones (REDZs) that were gazetted in GG 41445, GN 114 on 16 February 2018; and GG 44191, GN 144 on 26 February 2021, hence it is subjected to a full Scoping and EIA Process with a 107-day decision-making timeframe, as opposed to a BA Process and 57-day decision-making timeframe allowed for in the REDZs. The proposed project is located within the Central Strategic Transmission Corridor that was gazetted in GN 113 on 16 February 2018; however, the benefits only apply specifically to the EGI projects (Projects 13 – 26), as discussed above.

The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- ***“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure”.***

Chapter 4 of this EIA Report contains the detailed list of activities contained in GN R327, R325, and R324, which may be triggered by the various project components and thus form part of the Scoping and EIA Process.

1.4. Background on ABO Wind

ABO Wind AG is a Europe based company, which was formed in 1996. The company has since established subsidiaries in 13 countries. ABO Wind, the South African subsidiary, was founded in 2017. The company focuses on wind, solar and biogas technologies and works with landowners, technology providers, regulators and investors to source and develop renewable energy projects.

ABO Wind acts as the project developer and project interface, coordinating the research and studies, the site identification, the project structure, BAs, EIAs, selecting the strategic partners and arranging financing.

ABO Wind is committed to developing renewable energy in South Africa, and thus investing in the country. The company is currently working on a pipeline of around 5 GW of wind and solar projects as well as storage projects with batteries or hydrogen. As of 2021, 200 MW were sold during development; and 3 600 MW was under development by the company in South Africa.

1.5. Project Applicant

Each Solar PV Facility will have a dedicated Project Applicant. The Project Applicant for the Kudu Solar Facility 1 is Kudu Solar Facility 1 (Pty) Ltd.

1.6. Competent Authority and EIA Project Team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), ABO Wind has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the Scoping and EIA Process to determine the potential biophysical, social and economic impacts associated with the proposed project, and to identify how such negative impacts can be avoided, remedied, mitigated or managed; and how positive impacts can be enhanced. Public participation forms an integral part of the Scoping and EIA Process and assists in identifying issues and possible alternatives to be considered. The CSIR is also undertaking the Public Participation Process (PPP) for this Scoping and EIA Process, via an integrated approach including all 12 proposed projects. Details on the PPP are included in Chapter 4 of this EIA Report.

The 2014 NEMA EIA Regulations, as amended in GN 517 on 11 June 2021 states that the Competent Authority (CA) in respect of the listed activities “*is the CA in the province in which the activity is to be undertaken, unless: (a) it is an application for an activity contemplated in Section 24C(2) of the Act, in which case the CA is the Minister or an organ of state with delegated powers in terms of Section 42(1) of the Act; or (b) the application is a mining application in which case the CA is the Minister responsible for mineral resources*”.

With relevance to the proposed project, Section 24C (2) (a) (i) of NEMA states “*(2) the Minister must be identified as the competent authority in terms of subsection (1), unless otherwise agreed to in terms of section 24C (3), if the activity (a) has implications for international environmental commitments or relations, and where (i) it is identified by the Minister by notice in the Gazette*”.

Related to this, GN 779 states that, in terms of Sections 24C(1), 24C(2)(a)(i) and 24D of the NEMA, the Minister of Environmental Affairs (now Forestry, Fisheries and the Environment) is the CA for activities which are identified as activities in terms of Section 24(2)(a) of NEMA, which may not commence without an EA, and which relates to the IRP 2010 - 2030 and any updates thereto. The proposed project triggers various listed activities and thus requires EA. As noted above, the proposed project will be bid into a future bidding program of REIPPPP.

Based on the above, the National DFFE serves as the CA for the proposed project.

The project team, which is involved in this Scoping and EIA Process, is listed in Table 1.1 below. This team includes several specialists who have extensive experience in conducting specialist studies for renewable energy projects in South Africa.

Table 1.1: The EIA Project Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
<i>Environmental Management Services (CSIR)</i>		
Paul Lochner (<i>Registered EAP (2019/745)</i>)	CSIR	EAP, Technical Advisor and Quality Assurance
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>)	CSIR	EAP and Project Manager
Helen Antonopoulos	CSIR	Project Officer
Sonto Mkize	CSIR	Project Officer
Phindile Mthembu	CSIR	Project Officer
Luanita Snyman van der Walt (<i>Pr.Sci.Nat.</i>)	CSIR	GIS Specialist
Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Public Participation Specialist
<i>Specialists</i>		
Johann Lanz (<i>Pr.Sci.Nat.</i>)	Private	Agriculture and Soils Compliance Statement
Corne Niemandt (<i>Pr.Sci.Nat.</i>) Samuel Laurence (<i>Pr.Sci.Nat.</i>) Luke Verburgt	Enviro-Insight cc	Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species
Toni Belcher (<i>Pr.Sci.Nat.</i>) Dana Grobler (<i>Pr.Sci.Nat.</i>)	Private	Aquatic Biodiversity Impact Assessment
Chris van Rooyen Albert Froneman (<i>Pr.Sci.Nat.</i>)	Chris van Rooyen Consulting	Avifauna Impact Assessment
Quinton Lawson (<i>SACAP, 3686</i>) Bernard Oberholzer (<i>SACLAP, 87018</i>)	QARC and BOLA	Visual Impact Assessment
Dr Jayson Orton (<i>APHP: Member 43; ASAPA CRM Section: Member 233</i>)	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
Dr John Almond (<i>PSSA and APHP Member</i>)	Natura Viva cc	Palaeontology Site Sensitivity Verification Report
Tony Barbour and Schalk van der Merwe	Private	Socio-Economic Impact Assessment
Annebet Krige (<i>Pr Eng</i>)	Sturgeon Consulting	Traffic Impact Assessment
Debbie Mitchell (<i>Pr Eng</i>)	Ishecon cc	Battery Storage High Level Safety, Health and Environment Risk Assessment
Dale Barrow (<i>Pr.Sci.Nat.</i>) Christel van Staden (<i>Cand.Sci.Nat.</i>) Shane Teek (<i>Cand.Sci.Nat.</i>) Louis Jonk (<i>Pr.Sci.Nat.</i>) Julian Conrad	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment
Shane Teek (<i>Cand.Sci.Nat.</i>) Hardy Luttig Julian Conrad	GEOSS South Africa (PTY) Ltd	Geotechnical Assessment
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>) Helen Antonopoulos Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Civil Aviation Site Sensitivity Verification
Rohaida Abed (<i>Pr.Sci.Nat. and Registered EAP (2021/4067)</i>) Helen Antonopoulos Lizande Kellerman (<i>Pr.Sci.Nat.</i>)	CSIR	Defence Site Sensitivity Verification

The specialist studies commissioned as part of this Scoping and EIA Process are included in Chapters 6 to 17 of this EIA Report. Chapter 4 also includes motivation for not undertaking certain studies identified by the Screening Tool.

1.7. Details and Expertise of the CSIR EIA Project Management Team

This section provides information on the expertise of the CSIR EIA Project Management Team and Environmental Assessment Practitioner (EAPs).

Paul Lochner (*Registered EAP; Technical Advisor and Quality Assurance*):

Paul Lochner is an EAP at the CSIR in Stellenbosch, with more than 30 years of experience in a wide range of environmental assessment and management studies. Paul commenced work at CSIR in 1992, after completing a B.Sc. degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at focused on wetlands and estuarine management; environmental engineering in the coastal zone; and coastal zone management plans. Since 2008, Paul has been the leader and manager of the Environmental Management Services (EMS) group within CSIR that has been at the forefront of advancing environmental assessment in South Africa. This group currently consists of approximately 10 environmental scientists, planners and engineers, with offices in Stellenbosch, Cape Town and Durban. Paul's particular experience is in environmental planning and assessment for renewable energy, EGI, desalination, oil and gas, wetlands and coastal zone management, and industrial and port development. He has been closely involvement in the research and application of Strategic Environmental Assessment (SEA) in South Africa, and also has wide experience in Environmental and Social Impact Assessment, Environmental Management Programmes (EMPRs) and Environmental Screening Studies. He has been the project leader for over 40 SEAs and EIAs. He also served as project leader for a suite of SEAs commissioned by the DFFE from 2014 to 2020. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

Rohaida Abed (*Pr. Sci. Nat. and Registered EAP, Project Manager*):

Rohaida Abed is an EAP in the EMS group of the CSIR. She has 13 years of experience in the Environmental Management field, and has been involved in various transport infrastructure related projects as an Environmental Control Officer. She has also been involved in BAs and EIAs relating to renewable energy, port infrastructure and bulk liquid storage facilities in the capacity of Project Manager. She also worked on the SEA for Gas Pipeline and EGI Expansion from 2017 to 2019, which was commissioned by the National Departments of Environmental Affairs, Energy and Public Enterprises. She is a registered Professional Natural Scientist (400247/14) with the South African Council for Natural Scientific Professions (SACNASP), and a Registered EAP (2021/4067) with the EAPASA.

Helen Antonopoulos (*Project Officer*):

Helen Antonopoulos is an Environmental Consultant in training in the EMS group of the CSIR and holds BSc, BSc Honours, and MSc degrees in Environmental and Geographical Science from the University of Cape Town. She has assisted with compiling BAs and Scoping and EIAs for Solar Facilities in various provinces. She is interested in using renewable energy projects to promote sustainable development in South Africa.

Sonto Mkize (Project Officer):

Sonto holds a BSc and BSc Honours in Urban and Regional Planning from the University of the Witwatersrand, and a MSc in Sustainable Urban Planning and Design from KTH Royal Institute of Technology. She is an Environmental Consultant in training at the CSIR EMS group. She has assisted in compiling BA, Scoping and EIA Reports for wind and solar energy facilities in various provinces. Her key interests lie in maximising the opportunities presented by advancements in technological innovations to build inclusive smart cities and to enable a just energy transition using renewable resources.

Phindile Mthembu (Project Officer):

Phindile holds a BSS and BSc Honours in Geography and Environmental Management from the University of KwaZulu-Natal, and a MSc in Geography from the University of KwaZulu-Natal. She has experience in reviewing BA, Scoping and EIA Reports for various projects for Provincial Government. She is an Environmental Consultant in training at the CSIR EMS group. At the CSIR, she has assisted in compiling BA, Scoping and EIA Reports for wind and solar energy facilities in various provinces. Her area of interests includes reviewing and conducting EIAs.

1.8. Need and Desirability

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. Guidelines on Need and Desirability were published by the Department of Environmental Affairs (DEA) [now operating as the DFFE] in 2017⁹. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place.

Table 1.2 includes a list of questions based on the DEA's Guideline to determine the need and desirability of the proposed project. This table is informed by the outcomes of the Scoping and EIA Process, including the Specialist Assessments. Note that the Specialist Assessments are included in Chapters 6 to 17 of this EIA Report, and where relevant, the findings of these studies have been integrated into Table 1.2.

⁹ DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa. ISBN: 978-0-9802694-4-4.

Table 1.2: The Guideline on the Need and Desirability’s list of questions to determine the “Need and Desirability” of a proposed project

NEED	
Question	Response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	
<p>1.1. How were the following ecological integrity considerations taken into account?:</p> <p>1.1.1. Threatened Ecosystems,</p> <p>1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure,</p> <p>1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"),</p> <p>1.1.4. Conservation targets,</p> <p>1.1.5. Ecological drivers of the ecosystem,</p> <p>1.1.6. Environmental Management Framework,</p> <p>1.1.7. Spatial Development Framework, and</p> <p>1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).</p>	<p>The ecological sensitivities present within the study area have been assessed in detail in the Terrestrial Biodiversity and Plant and Animal Species, Aquatic Biodiversity, and Avifauna Impact Assessments during the EIA Phase. These assessments are included in Chapters 7, 8 and 9 of this EIA Report. The specialists have identified aquatic, terrestrial and avifaunal sensitive areas within the study area that need to be avoided by the proposed development, as well as other ecologically sensitive areas and how to suitably develop within these areas so that the ecological integrity is maintained.</p> <p>These Specialist Assessments have identified sensitivities within the study area¹⁰ that should be avoided, based on desktop assessments and field work.</p> <p>The Aquatic Biodiversity Assessment determined the following:</p> <ul style="list-style-type: none"> ▪ The aquatic features within the study area comprise ephemeral unnamed tributaries of the Orange River. The catchments of these tributaries are not within any National Freshwater Ecosystem Priority Area (FEPA) river sub-catchments. ▪ The larger watercourses flow along the eastern and western extents of the study area, flowing in a northerly direction to join the Orange River downstream of Van der Kloof Dam. Associated with these larger watercourses are wide floodplains. Smaller watercourses and drainage features drain into the larger river corridors. ▪ The ephemeral streams and floodplains provide aquatic habitat to a diverse array of faunal species. ▪ The present ecological condition of the aquatic features within the study area is rated as largely natural to moderately modified. ▪ The recommended ecological condition of the watercourses within the study area is largely natural to moderately modified.

¹⁰ The preferred site for the proposed Kudu Solar Facility comprises the full extent of the affected farm portions which cover a combined footprint of 8 150 ha, which serves as the study area for this Scoping and EIA Process. Therefore, the terms “site” and “study area” are used synonymously in the report. The Buildable Areas informed the identification of the “development footprint” and fall within the preferred site (or study area).

NEED	
Question	Response
	<ul style="list-style-type: none"> ▪ The larger watercourses (unnamed tributaries of the Orange River) and associated floodplains, as well as wetland areas within the study area, are deemed to be of medium aquatic ecological sensitivity. ▪ The smaller feeder streams/watercourses and drainage lines, and dams are considered to be of low aquatic ecological sensitivity. ▪ Buffers have been recommended to protect the aquatic ecosystems. <p>The Terrestrial Biodiversity and Plant and Animal Species Assessment determined the following:</p> <ul style="list-style-type: none"> ▪ Identified Ecological Support Areas (ESA) according to the Northern Cape Critical Biodiversity Area (CBA) Map (2016) extend over a wide area in this specific region of the Northern Cape. The entire site / study area, and thus all identified buildable areas and development footprints, are located within the ESA. The ESA is due to the site being in the Platberg-Karoo Conservancy (not formally protected), the vegetation units and important wetland and river features. The specialist notes that the vegetation itself is not considered sensitive but do provide important feeding and breeding habitat for fauna. Important river and wetland features occur in the landscape, which are vital for ecosystem services, maintaining connectivity in the landscape, and act as important habitats for many fauna species. However, the recommendations of the Aquatic and Avifauna Specialists have been taken into consideration in the layout planning, and sensitive areas have been avoided accordingly. The specialist has noted that the overall sensitivity of the site is considered Medium, with some landscape features, including the Koppies, as medium sensitivity. The specialist confirms that the ESA within the site cannot be regarded as very high sensitivity as it is not irreplaceable areas, and depending on what ecological features it is based on, can be regarded as Medium or High. ▪ Four main habitats were identified based on species composition and structure, namely 'White Grassland', 'Shrubby Grassland', 'Watercourse', and 'Koppies'. In addition, 'Transformed' areas were included which consists of existing roads, homesteads and bare soil. ▪ The following sensitive features are rated with a high sensitivity:

NEED	
Question	Response
	<ul style="list-style-type: none"> ○ The Koppies habitat are high sensitivity features which must be avoided by development activities. Only limited development activities of low impact will be acceptable. Linear infrastructure such as roads and overhead powerlines should not cross the Koppies, and pylons should not be constructed in this habitat. No buffer applies to the Koppies. ▪ The following sensitive features are rated with a medium sensitivity: <ul style="list-style-type: none"> ○ The White and Shrubby Grasslands are considered moderately sensitive owing to its pristine nature with limited major impacts, mostly concentrated at homesteads, cattle camps and watering holes. Restoration efforts post-construction for temporary laydown areas are critical, as well as after the decommissioning of the project. ○ The Watercourse sensitivity is medium. ▪ Existing Transformed areas are rated as very low sensitivity. <p>The Avifauna Assessment noted the following:</p> <ul style="list-style-type: none"> ▪ The study area is located in the Platberg-Karoo Conservancy Important Bird Area. ▪ The study area is not located within any Protected Areas and National Protected Areas Expansion Strategy (NPAES) focus areas. ▪ A total of 85 species could potentially occur within the Broader Area where the project is located. Of these, 21 are classified as priority species for solar developments. Of the 21 priority species, 17 were recorded during the monitoring, and 15 priority species have a medium to high probability of occurring regularly in the Study Area. Five Species of Conservation Concern (SCC) species were recorded during the site surveys, namely Blue Crane, Martial Eagle, Verreaux's Eagle, Cape Vultures and White-backed Vulture. ▪ Based on the desktop analysis and the Site Sensitivity Verification undertaken, various buffers have been recommended (e.g. 1 km all infrastructure exclusion zone for a Verreaux's Eagle nest found within the study area to prevent the displacement of the breeding pair during the construction phase due to disturbance; as well as solar panel exclusion zones (other infrastructure allowed) around certain waterpoints)).

NEED	
Question	Response
	<p>The feature and sensitivity map for the study area, and the combined layout and sensitivity map are included in Chapter 20 of this EIA Report.</p> <p>The sensitivities identified by the various specialists, as highlighted above, have been taken into consideration and avoided where possible in order to identify the Buildable Areas / development footprint.</p> <p>These specialists concluded that the proposed project could proceed provided that the recommended mitigation measures and management actions provided are implemented.</p>
<p>1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>The ecological sensitivities present within the study area have been assessed in detail in the Terrestrial Biodiversity and Plant and Animal Species, Aquatic Biodiversity, and Avifauna Impact Assessments during the EIA Phase. The specialists have identified aquatic, terrestrial and avifaunal sensitive areas within the study area that need to be avoided by the proposed development, as well as other ecologically sensitive areas and how to suitably develop within these areas so that the ecological integrity is maintained.</p> <p>Refer to the response to Question 1.1 regarding the sensitivities identified in the Terrestrial Biodiversity and Plant and Animal Species, Aquatic Biodiversity, and Avifauna Specialist Assessments.</p> <p>The feature and sensitivity map for the study area, and the combined layout and sensitivity map are included in Chapter 20 of this EIA Report. The sensitivities identified by the various specialists, as highlighted above, have been taken into consideration and avoided where possible in order to identify the Buildable Areas / development footprint.</p> <p>The Terrestrial Biodiversity and Plant and Animal Species Assessment has identified various potential impacts, which are listed below:</p> <ul style="list-style-type: none"> ▪ Construction Phase: <ul style="list-style-type: none"> ○ Fragmentation and loss of habitat and sensitive features. ○ Loss of protected species.

NEED	
Question	Response
	<ul style="list-style-type: none"> ○ Introduction and spread of alien invasive species. ○ Increased erosion and soil compaction. ○ Littering and general pollution. ▪ Operational Phase: <ul style="list-style-type: none"> ○ Increase in alien invasive species. ○ Loss of species composition and diversity. ○ Littering and general pollution. ▪ Decommissioning Phase: <ul style="list-style-type: none"> ○ Increase in alien invasive species. ○ Loss of habitat. <p>Various mitigation measures have been identified to reduce the significance of or manage the impact. These measures are documented in the Specialist Assessment, and include, for example:</p> <ul style="list-style-type: none"> ▪ No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the high sensitivity areas. ▪ No development should take place within High sensitivity areas or buffer zones. Accordingly, the Koppies habitat (where relevant) should be avoided. ▪ Where the approved layout designs impact on individuals, permit applications are required for either the relocation or destruction of provincially protected species (Northern Cape Nature Conservation Act 9 of 2009) and for protected trees in terms of the National Forests Act (Act 84 of 1998). <p>Measures to avoid, remedy, mitigate and manage impacts are included in the Environmental Management Programme (EMPr), included in Appendix I and Appendix J of this EIA Report.</p> <p>In summary, the potential disturbance of ecosystems, and potential loss or protection of biological diversity have been identified as potential impacts in the Terrestrial Biodiversity and Plant and Animal Species Assessment. In addition, avoidance mechanisms have been adopted, whereby the highly sensitive ecological features have been avoided in the</p>

NEED	
Question	Response
	Buildable Areas. In addition, mitigation measures have been provided to minimise and remedy the potential impacts. All the potential impacts have been assessed in the EIA Phase.
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	<p>Various Specialists Assessments have been compiled and are included in this EIA Report. These assessments have identified sensitivities within the study area that should be avoided, based on desktop assessments and field work. This has informed the identification of the Buildable Areas / development footprint. In addition, the assessments have identified various potential negative impacts that the proposed project may result in, such as degradation to the biophysical environment and potential pollution. The associated mitigation measures have also been identified. Refer to the detailed specialist assessments in Chapters 6 to 17 of this report.</p> <p>Measures to avoid, remedy, mitigate or manage biophysical impacts are included in the EMPr.</p>
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	<p>Waste will mostly be generated during the construction and decommissioning phases of the proposed project.</p> <p>Approximately 50 m³ and 1.92 m³ of solid waste is estimated to be generated per month during the construction phase and operational phase, respectively for the proposed project.</p> <p>The following waste materials are expected during the construction phase:</p> <ul style="list-style-type: none"> ▪ Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts; ▪ Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals; ▪ Building rubble, discarded bricks, wood and concrete; ▪ Domestic waste generated by personnel; and ▪ Vegetation waste generated from the clearing of vegetation. <p>During the operational phase, the facility will produce minor amounts of general waste (as a result of the offices or maintenance). Waste generated on site will be disposed of at a</p>

NEED	
Question	Response
	<p>licenced landfill site. Refer to Chapter 2 (Project Description) of this EIA Report for a detailed description of the waste to be generated by the proposed project.</p> <p>Measures to avoid, remedy, reduce, mitigate or manage waste are included in the EMPr.</p>
<p>1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>A Heritage Impact Assessment (HIA) was undertaken during the EIA Phase to assess potential archaeological and cultural impacts resulting from the proposed project.</p> <p>This HIA (included in Chapter 11 of this EIA Report) has identified the following potential impacts:</p> <ul style="list-style-type: none"> ▪ Construction Phase: <ul style="list-style-type: none"> ○ Potential impacts on archaeology. ○ Potential impacts on graves. ○ Potential impacts on the cultural landscape. ▪ Operational Phase: <ul style="list-style-type: none"> ○ Potential impacts on the cultural landscape. ▪ Decommissioning Phase: <ul style="list-style-type: none"> ○ Potential impacts on the cultural landscape. ▪ Cumulative Impacts: <ul style="list-style-type: none"> ○ Construction and Decommissioning Phases: <ul style="list-style-type: none"> ▪ Potential impacts on archaeology. ▪ Potential impacts on graves. ○ Operational Phase: <ul style="list-style-type: none"> ▪ Potential impacts on the cultural landscape. <p>Overall, with the recommended mitigation measures being implemented, the potential impacts have been rated with a low significance. The HIA has also been sent to the South African Heritage Resources Agency (SAHRA) for comment during the 30-day review of the Draft EIA Report during the EIA Phase. SAHRA has provided comments, which are included in Appendix H.6 of this EIA Report, and responded to accordingly in the Comments and Responses Report (Appendix H.7 of this EIA Report).</p>

NEED	
Question	Response
	<p>A Palaeontology Site Sensitivity Verification Report has been completed and included in Chapter 12 of this EIA Report. The Site Sensitivity Verification Report notes that the Screening Tool depicts a Medium to High palaeo-sensitivity for the majority of the study area. However, the specialist has recommended, based on a 2-day palaeontological site visit and several previous field-based and desktop Palaeontology Impact Assessment (PIA) studies in the broader De Aar – Kimberley region, that the study area is of Low to Very Low palaeo-sensitivity in general. If any fossiliferous deposits are exposed by surface clearance or excavations during the construction phase, the Chance Fossils Finds Protocol should be fully implemented. Provided that the Chance Fossil Finds Protocol is incorporated into the EMPr and fully implemented during the construction phase, there are no objections on palaeontological heritage grounds to authorisation of the proposed project. Pending the discovery of significant new fossil finds before or during construction, <u>no further specialist palaeontological studies, monitoring or mitigation are recommended for this proposed project.</u> The Chance Fossil Finds Protocol has been included in the EMPr (Appendix I and Appendix J of the EIA Report).</p>
<p>1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>Measures to avoid, remedy, mitigate or manage impacts on non-renewable natural resources have been included in the EMPr (Appendix I and Appendix J of the EIA Report). However, the proposed project is focused on the use of renewable natural resources (i.e. a Solar PV Facility).</p>
<p>1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?</p> <p>1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic</p>	<p>South Africa has heavily relied on coal as a source of electricity for decades. Due to the nature of coal as a non-renewable resource that causes major environmental degradation, there is a need to identify alternative resources that could promote sustainable energy as well as cleaner energy production mechanisms. The proposed project aims to harness the solar resources available in the area for the generation of electricity. This project is seen as a source of 'clean energy' and reduces the dependence on non-renewable sources. The proposed project is intended to form part of the Renewable Energy Independent Power Producer Programme (REIPPPP), and therefore aims to contribute to the energy mix of South Africa, in line with the Integrated Resource Plan (IRP). The</p>

NEED	
Question	Response
<p>growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)</p> <p>1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources of the proposed development alternative?)</p> <p>1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?</p>	<p>need for renewable energy is clear, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation.</p> <p>An assessment of the project alternatives including the site suitability for the proposed project is included in Chapter 5 of this EIA Report. The proposed project is a sustainable option for the area and the development footprint and buildable areas have avoided areas of very high environmental sensitivity. No fatal flaws were identified that could prevent the proposed project from being realised, should such authorisation be granted.</p> <p>In addition, various Specialist Assessments have been compiled and are included in Chapters 6 to 17 of this EIA Report. These assessments have identified various potential negative impacts that the proposed project may result in. The associated mitigation measures have also been identified in these studies.</p>
<p>1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?</p> <p>1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</p> <p>1.8.2. What is the level of risk associated with the limits of current knowledge?</p> <p>1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</p>	<p>The precautionary approach has been adopted for this study, i.e. assuming the maximum development scenario will occur and then identifying ways to mitigate or manage these impacts. In addition, the specialist assessments that have been compiled during the EIA Phase have provided detailed feedback on any uncertainties, assumptions, and risks associated with limits of current knowledge.</p>
<p>1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following:</p> <p>1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</p>	<p>A detailed Socio-Economic Impact Assessment is included in this EIA Report that considers the impact of the proposed project from a socio-economic perspective. The Socio-Economic assessment (Chapter 13 of this EIA Report) has identified the following impacts:</p> <ul style="list-style-type: none"> ▪ Construction Phase: <ul style="list-style-type: none"> ○ Potential positive impacts: <ul style="list-style-type: none"> ▪ Creation of employment and business opportunities, and opportunity for skills development and on-site training. ○ Potential negative impacts:

NEED	
Question	Response
<p>1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</p>	<ul style="list-style-type: none"> ▪ Impacts associated with the presence of construction workers on local communities. ▪ Impacts related to the potential influx of job-seekers. ▪ Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site. ▪ Increased risk of grass fires associated with construction related activities. ▪ Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles. ▪ Impact on productive farmland. ▪ Operational Phase: <ul style="list-style-type: none"> ○ Potential positive impacts: <ul style="list-style-type: none"> ▪ The establishment of infrastructure to improve energy security and support the renewable sector. ▪ Creation of employment opportunities. ▪ Benefits to the affected landowners. ▪ Benefits associated with the socio-economic contributions to community development. ○ Potential negative impacts: <ul style="list-style-type: none"> ▪ Visual impacts and associated impacts on sense of place. ▪ Impact on property values. ▪ Impact on tourism. ▪ Decommissioning Phase: <ul style="list-style-type: none"> ○ Potential negative impacts: <ul style="list-style-type: none"> ▪ Social impacts associated with retrenchment including loss of jobs, and source of income. <p>The findings of the Socio-Economic Assessment indicate that the proposed project will result in several social and socio-economic benefits. The enhancement measures listed</p>

NEED	
Question	Response
	<p>in the assessment should be implemented in order to maximise the potential benefits. The significance of this impact is rated as High Positive. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings also indicate that the potential negative impacts associated with both the construction and operational phase are likely to be Low Negative with mitigation. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. The study concluded that the establishment of the proposed project is supported by the findings of the Socio-Economic Assessment. The no-go option is not supported by the findings of the Socio-Economic Assessment.</p>
<p>1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?</p>	<p>Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area are considered as part of the relevant specialist assessments, such as the Socio-Economic Assessment, Visual Impact Assessment, HIA, and Battery Energy Storage System (BESS) High Level Safety, Health and Environment Risk Assessment.</p>
<p>1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?</p>	<p>The impacts on ecological integrity objectives of the area are considered as part of the Terrestrial Biodiversity and Plant and Animal Species, Aquatic Biodiversity, and Avifauna Impact Assessments. Refer to the responses provided to Questions 1.1 to 1.10 regarding the sensitivities identified in these Specialist Assessments, as well as the potential impacts identified on terrestrial biodiversity.</p>
<p>1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?</p>	<p>Chapter 5 of this EIA Report includes a full description of alternatives assessed during the EIA Phase. The no-go alternative and technology alternatives (relating to the BESS) were assessed during the EIA Phase. Note that the specialists have assessed Solid State Lithium Ion and Redox Flow BESS technologies, and both are deemed acceptable. The preferred technology is discussed in Chapter 20 of this EIA Report (Conclusions and Recommendations). The approach followed to identify the buildable areas was to use environmental and social constraints to avoid sensitive features, thus applying mitigation hierarchy thinking. This approach replaces the need to rank alternative sites and locations, as it leads to the selection of the least sensitive development footprint.</p>

NEED	
Question	Response
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Each specialist assessment has taken into consideration and has assessed the potential cumulative impacts of this proposed project. Refer to Chapters 6 to 17 of this EIA Report where the potential cumulative impacts are discussed for this project. Note that no residual cumulative impacts of very high significance were rated by the specialists, and no fatal flaws are present.
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area.	<p>The proposed project is entirely located within the Renosterberg Local Municipality (RLM) and Pixley Ka Seme District Municipality (PKSDM).</p> <p>The Integrated Development Plan (IDP) for the RLM could not be sourced during the Scoping and EIA Process. This is corroborated by the Socio-Economic Specialist Assessment (Chapter 13), which notes that this is likely linked to the dissolution of RLM by the Northern Cape Provincial Government on 7 September 2020.</p> <p>However, the Final IDP (2022 – 2027) for the PKSDM that was adopted in June 2022 is available. The vision for the PKSDM is “<i>Sustainably Developed District for future Generations</i>” (PKSDM, 2022, Page 23¹¹); and the mission is:</p> <ul style="list-style-type: none"> ▪ “<i>Supporting our local municipalities to create a home for all in our towns, settlements and rural areas to render dedicated services;</i> ▪ <i>Providing political and administrative leadership and direction in the development planning process;</i> ▪ <i>Promoting economic growth that is shared across and within communities;</i> ▪ <i>Promoting and enhancing integrated development planning in the operations of our municipalities; and</i> ▪ <i>Aligning development initiatives in the district to the National Development Plan.”</i> (PKSDM, 2022, Page 23).

¹¹ Pixley Ka Seme District Final Integrated Development Plan (IDP) 2022 – 2027. 2022. Available: [https://www.pksgdm.gov.za/idps/PKSDM%20Final%20Integrated%20Development%20Plan%20\(IDP\)%202022-2027.pdf](https://www.pksgdm.gov.za/idps/PKSDM%20Final%20Integrated%20Development%20Plan%20(IDP)%202022-2027.pdf). [online] Accessed: November 2022.

NEED	
Question	Response
	<p>The 2019-2020 IDP notes that the economy in the PKSDM is characterized by:</p> <ul style="list-style-type: none"> ▪ High levels of poverty and low levels of education. ▪ Low levels of development despite the strategic location in terms of the national transport corridors. ▪ High rate of unemployment, poverty and social grant dependence. ▪ Prone to significant environmental changes owing to long-term structural changes (such as climate change, energy crises and other shifts). <p>The IDP recognises renewable energy projects as potential sustainable economic development opportunities. The development of the proposed project will therefore also be in line with the vision of the PKSDM to diversify the job market by creating and supporting sustainable economic growth and development opportunities.</p> <p>The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the DFFE). Approximately 150 employment opportunities will be created during the construction phase, and approximately 8 during the operational phase of the proposed project. It should, however, be noted that employment during the construction phase will be temporary, whilst the employment opportunities during the operational phase will be long-term.</p> <p>Therefore, the proposed project would help to address the need for increased electricity supply to the national grid while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. These factors are linked to the REIPPPP.</p>
2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.)	This is not applicable as the proposed project is located within a rural area and the site is zoned for agricultural use.
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	The Terrestrial Biodiversity and Plant and Animal Species Specialist Assessment (Chapter 7) notes that the land within the study area is currently being used for livestock grazing, with some game animals such as springbok. Infrastructure such as homesteads, livestock pens, windpumps, waterpoints, gravel farm roads and fences are located on the

NEED	
Question	Response
	<p>affected properties. Furthermore, existing overhead powerlines run through the study area.</p> <p>An HIA (Chapter 11) has been undertaken during the EIA Phase to assess potential archaeological and cultural impacts resulting from the proposed project. Refer to the response to Question 1.5 for detailed feedback on the impacts identified on Archaeology and Cultural Heritage, as well as feedback on the palaeontology.</p> <p>Should the proposed project proceed, it is not expected that the agricultural activities present on site will be significantly threatened. An Agricultural Compliance Statement has been included as Chapter 6 of this EIA Report. The compliance statement considers the impact of the proposed project in terms of the land capability and agricultural potential. As noted in Chapter 6, the proposed site is identified as being of predominantly low and medium sensitivity for agricultural resources.</p> <p>As noted, an EMPr has been compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced.</p> <p>The impact on the sense of place is difficult to predict and would potentially be ambiguous. This is due to the subjective nature of perceptions regarding the relative attraction or disturbance of the solar facilities in a rural landscape. The visual impact and considerations were assessed as part of the Visual Impact Assessment (Chapter 10) undertaken during the EIA Phase. The Visual Impact Assessment has provided more accurate mapping of landscape features at the detailed project scale, being a refinement of the Screening Tool Landscape Sensitivity Map. No significant landscape or scenic features would be affected by the proposed project. The Socio-Economic Assessment (Chapter 13) also addresses sense of place. No fatal flaws have been identified from a sense of place perspective. Recommended mitigation measures have been included in the EMPr, as required and where relevant.</p>

NEED	
Question	Response
	The feature and sensitivity map for the study area, and the combined layout and sensitivity map are included in Chapter 20 of this EIA Report. The sensitivities identified by the various specialists have been taken into consideration and avoided where possible in order to identify the Buildable Areas.
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	The LED Strategy has been considered in the Socio-Economic Assessment (Chapter 13 of the EIA Report). However, the Final IDP (2022 – 2027 ¹⁰) for the PKSDM notes that one of the thrusts in the National LED Strategy is focused on renewable energy development and enhancing efficiency in the energy sector.
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	<p>This has been addressed in detail in the Socio-Economic Impact Assessment (Chapter 13 of the EIA Report). The assessment considers the impact of the proposed project from a socio-economic perspective.</p> <p>The REIPPPP has contributed significantly towards meeting South Africa's Greenhouse Gas emission targets and, at the same time, supporting energy security, economic stability, and environmental sustainability. The establishment of renewable energy facilities, such as the proposed project, therefore, not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.</p> <p>A socio-economic profile is included in Chapter 3 of this EIA Report. Refer to the response provided to Question 1.9 for a description of the impacts identified.</p>
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	These needs and interests of the relevant communities has been addressed in the Socio-Economic Assessment. Issues raised by Interested and Affected Parties (I&APs) to this effect are addressed in the relevant specialist assessments (i.e. summary of issues raised during the Scoping Phase, and adequate responses). An Issues and Responses Trail is also included in Appendix F.5 of this EIA Report, which includes all comments raised during the release of the Background Information Document (BID), with responses provided by the EIA Project Team. Appendix F.11 includes the Issues and Responses Trail for all issues raised by I&APs during the 30-day review of the Draft Scoping Report, as well as corresponding responses. Comments raised have been addressed where relevant during the EIA Phase.

NEED	
Question	Response
	All comments submitted during the 30-day review period of the Draft EIA Report have been incorporated in the Comments and Responses Report, and addressed, as applicable and where relevant, and is included as an appendix in this Final EIA Report, specifically Appendix H.7.
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	This has been addressed in the Socio-Economic Impact Assessment that is included in the EIA Report. The assessment considers the impact of the proposed project from a socio-economic perspective. Refer to the response provided to Question 1.9 for a description of the impacts identified.
2.5. In terms of location, describe how the placement of the proposed development will:	
2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other	Local employment opportunities will be provided as far as possible. Approximately 150 employment opportunities will be created during the construction phase, and approximately 8 during the operational phase of the proposed project. It should, however, be noted that employment during the construction phase will be temporary, whilst the employment opportunities during the operational phase will be long-term.
2.5.2. reduce the need for transport of people and goods	This is not applicable as the proposed project is located within a remote rural area and the site is zoned for agricultural use. This project is a renewable energy project proposal. Nevertheless, traffic related impacts of the proposed project are addressed in the Traffic Impact Assessment and has been provided as Chapter 14 in this EIA Report.
2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport)	This is not applicable as the proposed project is located within a remote rural area and the site is zoned for agricultural use. This project is a renewable energy project proposal. Refer to the response provided to Question 2.5.2.
2.5.4. compliment other uses in the area	As noted above, the land within the study area is currently being used for livestock grazing. The Agricultural Compliance Statement (Chapter 6) notes the following: <ul style="list-style-type: none"> ▪ The proposed project will occupy land that is of very limited land capability, which is insufficient for crop production. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority. ▪ The amount of agricultural land used by the proposed project is well within the allowable development limits prescribed by the Agricultural Protocol of GN 320. ▪ The proposed project offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.

NEED	
Question	Response
	<ul style="list-style-type: none"> ▪ The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy. <p>Based on the above, the proposed project is understood to compliment other uses in the area.</p> <p>Furthermore, relevant impacts on sense of place, property values, and tourism have been addressed in the Socio-Economic Assessment, and recommendations for mitigation have been included in the EMPr.</p>
2.5.5. be in line with the planning for the area	<p>The Final IDP (2022 – 2027¹⁰) for the PKSDM identifies solar energy as a development opportunity in the RLM.</p> <p>Based on the Socio-Economic Assessment (Chapter 13 of this EIA Report), the 2017 PKSDM Spatial Development Framework (SDF) notes the establishment of a Renewable Energy Hub stretching from the west coast up to De Aar region.</p> <p>Furthermore, the proposed project is also located within the Central Strategic Transmission Corridor that was gazetted in February 2018. This facilitates large scale transmission and distribution EGI, which would be needed to support the proposed project. Therefore, the proposed project is in line with the planning for the area.</p>
2.5.6. for urban related development, make use of the underutilised land available with the urban edge	<p>This is not applicable as the proposed project is located within a remote rural area and the site is zoned for agricultural use.</p>
2.5.7. optimise the use of existing resources and infrastructure	<p>The proposed project is planned to connect to the existing Hydra-Perseus 400 kV overhead power line via dedicated proposed 132 kV power lines and an independent Main Transmission Substation (MTS). However, if the proposed Eskom Hydra B Substation is built by Eskom, then additional upgrades of this Eskom substation would be undertaken to ensure that the substation can accommodate the power generated by the proposed 12 Kudu Solar Facilities. This is being considered as to minimise impacts and make use of existing infrastructure. Separate Basic Assessment (BA) and/or EGI Standard Registration Processes will be undertaken for the EGI Projects (Projects 13 – 26).</p>
2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for	<p>The proposed project is a renewable energy project and not related to bulk infrastructure expansion.</p>

NEED	
Question	Response
the settlement that reflects the spatial reconstruction priorities of the settlement)	
2.5.9. discourage "urban sprawl" and contribute to compaction/densification	This has been addressed in the Socio-Economic Impact Assessment (Chapter 13 of the EIA Report). The assessment considers impacts such as those associated with the presence of construction workers on local communities; and the impacts related to the potential influx of job seekers.
2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs	This is not applicable as the proposed project is located within a remote rural area and the site is zoned for agricultural use.
2.5.11. encourage environmentally sustainable land development practices and processes	The development of a renewable energy facility is a sustainable land development practice provided it is constructed and operated in an environmentally conscious manner.
2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.)	Refer to Chapter 5 of this EIA Report for a description of the process undertaken to identify the study area as the preferred site for the solar PV facility.
2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential)	This has been addressed within the Socio-Economic Impact Assessment (Chapter 13 of the EIA Report).
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area	An HIA (Chapter 11 of this EIA Report) has been undertaken during the EIA Phase to assess potential archaeological and cultural impacts resulting from the proposed project. Refer to the response to Question 1.5 for detailed feedback on the impacts identified on Archaeology and Cultural Heritage, as well as feedback on the palaeontology. The visual impact and considerations, including sense of place, have been further assessed as part of the Visual Impact Assessment (Chapter 10 of this EIA Report). Refer to the response provided to Question 2.1.3 for additional feedback on the potential visual impacts.
2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	Several renewable energy projects have been granted EA in the vicinity of De Aar and the surrounding region. Chapter 4 of this EIA Report includes a list of other renewable energy and electricity grid infrastructure (EGI) projects within a 30 km radius that have received EA or are currently going through an Environmental Assessment process.

NEED	
Question	Response
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The precautionary approach has been adopted for this study, i.e. assuming the maximum development scenario will occur and then identifying ways to mitigate or manage these impacts. In addition, the specialist assessments compiled for the EIA Phase provide detailed feedback on any uncertainties, assumptions, and risks associated with limits of current knowledge. The Socio-Economic Specialist Assessment included as Chapter 13 of this EIA Report provides input on the assumptions and limitations.
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	A detailed Socio-Economic Impact Assessment is included in this EIA Report that considers the impact of the proposed project from a socio-economic perspective. A preliminary socio-economic profile is included in Chapter 3 of this EIA Report. Refer to the response provided to Question 1.9 for a description of the impacts identified in the Socio-Economic Scoping Level assessment.
2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	In addition, measures to avoid, remedy, mitigate or manage negative socio-economic impacts and enhance positive socio-economic impacts are included in the EMPr that is included in Appendix I and Appendix J of this EIA Report. Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area, as well as how the potential socio-economic impacts will result in ecological impacts are considered as part of the relevant specialist assessments.
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	With regards to the best practicable environmental option, Chapter 5 of this EIA Report includes a full description of alternatives that have been assessed during the EIA Phase. Refer to the response provided to Question 1.12 above for additional information on the alternatives considered.
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified,	

NEED	
Question	Response
allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	
2.13. What measures were taken to:	
2.13.1. ensure the participation of all interested and affected parties	The supporting documentation of the Public Participation Process (PPP) that was undertaken during the Scoping Phase is included as Appendix F of this EIA Report, and the PPP undertaken during the EIA Phase is described in Chapter 4, with supporting documentation in Appendix H. The PPP complies with the 2014 NEMA EIA Regulations (as amended). Various methods have been employed to notify potential I&APs of the proposed project, namely, through newspaper advertisements, site notices boards, notification letters and communication via email, as well as text messages, and telephonic discussions where possible.
2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation	
2.13.3. ensure participation by vulnerable and disadvantaged persons	
2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means	The EIA Process aims to take cognisance of all interests, needs, and values espoused by all I&APs. Opportunity for public participation have been provided to all I&APs throughout the EIA Process in terms of the 2014 NEMA EIA Regulations (as amended).
2.13.5. ensure openness and transparency, and access to information in terms of the process	The supporting documentation of the PPP undertaken during the Scoping Phase is included in Appendix F of this EIA Report, and the PPP undertaken during the EIA Phase is described in Chapter 4, as well as supporting documentation in Appendix H. Refer to the responses provided to Questions 2.13.1 – 2.13.3 above.
2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge	The EIA process takes cognisance of relevant interests, needs and values adopted by I&APs.

NEED	
Question	Response
2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted	Public participation of all I&APs has been promoted and opportunities for engagement have been provided during the EIA process.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	This is addressed in the Socio-Economic Impact Assessment that is included in the EIA Report. Refer to the responses provided to Questions 1.9, 2.2 and 2.3.
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	An EMPr was developed during the EIA Phase to address environmental, health and safety concerns. An Environmental Control Officer (ECO) will be appointed to monitor compliance with the EMPr and EA (should such authorisation be granted) during the construction and operational phases.
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1. the number of temporary versus permanent jobs that will be created	This is addressed in the Socio-Economic Impact Assessment that is included in the EIA Report. Refer to the response provided to Question 1.9 for a description of the impacts identified from a socio-economic perspective, and also the responses to Questions 2.1.1 and 2.5.1 for feedback on potential employment opportunities.
2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area)	
2.16.3. the distance from where labourers will have to travel	
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits)	
2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17. What measures were taken to ensure:	
2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment	Various government departments have been listed as I&APs and were given the opportunity to comment on the Draft Scoping Report and have also been given the opportunity to comment on the Draft EIA Report during the 30-day public participation period (i.e. current phase). Comments received are included in Appendix H.6 of this EIA Report, and responded to, as relevant, in the Comments and Responses Report in Appendix H.7

NEED	
Question	Response
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	No conflicts of interests between organs of state were identified during the EIA Process.
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The proposed project aims to adhere to the principles of environmental management in NEMA. Measures taken to ensure adherence to the principles of NEMA are essentially addressed through the management actions and monitoring recommendations included in the EMPr. In addition, the outcomes of this Scoping and EIA Process and the associated conditions of the EA (should it be received) serve to address this question.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The proposed mitigation measures included in the EMPr were informed by the specialist assessments that were undertaken. This includes a detailed assessment of the environment as well as the impacts associated with the proposed project. Detailed specialist assessments have all concluded that the project can proceed, with no fatal flaws or unacceptable impacts identified as part of the proposed project. Therefore, the mitigation measures are deemed to be realistic and practical. The EMPr is included in Appendix I and Appendix J of this EIA Report.
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The EMPr for the proposed project will form part of the contractual agreement and must be adhered to by the contractors, construction workers and the Project Applicant. The EMPr includes measures to ensure that the costs to potentially remedy pollution, environmental degradation and consequent adverse health effects will be paid for by those responsible for the relevant environmental impacts. The EMPr accordingly includes measures to ensure that the costs to potentially prevent, control or minimise further pollution, environmental damage or adverse health effects will be paid for by those responsible for the relevant environmental impacts. Roles and responsibilities for the implementation of management actions, and monitoring thereof are included in the EMPr.
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Agriculture on site is influenced by climatic variables and limitations. Renewable energy development is a suitable land use option for the site. The proposed project would be more robust in terms of economic viability and profitability while also being largely uninfluenced by climate change variables. The proposed project would also provide the farm owners (i.e. of the land on which the PV project is being proposed) with additional income by way of lease agreements and will also contribute to local socio-economic upliftment through job creation.

NEED	
Question	Response
	Chapter 5 of this EIA Report includes a full description of alternatives that have been assessed during the EIA Phase. Refer to the response provided to Question 1.12 above for additional information on the alternatives to be considered.
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and other planned developments in the area?	<p>The potential cumulative impacts resulting from the proposed project have been assessed as part of the EIA Phase.</p> <p>Refer to Chapter 4 of this EIA Report where the list of other renewable energy and EGI projects within a 30 km radius considered in the cumulative impact assessment are discussed. The Socio-Economic Specialist Assessment (Chapter 13) identified the following cumulative impacts:</p> <ul style="list-style-type: none"> ▪ Cumulative impact on sense of place (negative impact). ▪ Cumulative impact on services (negative impact). ▪ Cumulative impact on local economies (positive impact). <p>None of the above negative impacts were identified with a high or very high significance after mitigation.</p>

1.9. Objectives for this EIA Report

This EIA Report was preceded by a comprehensive Scoping Process. During the Scoping Phase, the Scoping Report was made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 9 December 2022 to 30 January 2023. Issues raised in response to the Draft Scoping Report were captured in an Issues and Responses Trail. The Final Scoping Report was submitted to the DFFE in February 2023 for consideration (i.e. acceptance or refusal of EA) in line with Regulation 21 (1) of GN R326. The DFFE accepted the Final Scoping Report and Plan of Study for EIA in March 2023. Refer to Appendix G of this EIA Report for a copy of this acceptance letter. This acceptance marked the end of the Scoping Phase after which the EIA Process moved into the impact assessment and reporting phase.

For the purpose of completeness and continuity, the documentation associated with the Public Participation Process undertaken in the Scoping Phase, and comments received from I&APs during the Scoping Phase, are included in Appendix F of this EIA Report. The Issues and Responses Trail for the comments received during the review of the Background Information Document and Draft Scoping Report are respectively included in Appendix F.5 and Appendix F.11 of this EIA Report. For background on the Scoping Process, the reader is referred to the Final Scoping Report (CSIR, 2023).

The EIA Phase of this Scoping and EIA Process is shaped by the findings of the Scoping Phase. The 2014 NEMA EIA Regulations (as amended) stipulates that the EIA Process must be undertaken in line with the approved Plan of Study for the EIA¹², and that it must include a description of the potential environmental impacts, mitigation, and closure outcomes, as well as the residual risks of the proposed activity. In broad terms, the objectives of the EIA Process in terms of the 2014 NEMA EIA Regulations (as amended) are to:

- determine the policy and legislative context within which the activity is located and note 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 development footprint on the approved site as contemplated in the accepted scoping report;
- identify the location of the development footprint within the approved site as contemplated in the accepted scoping report 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 the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

¹² The Plan of Study for the EIA was detailed in Chapter 7 of the Final Scoping Report, which was accepted by the DFFE in March 2023.

- identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report 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.

In terms of legal requirements, a crucial objective of the EIA Report is to satisfy the requirements of Appendix 3 of the 2014 NEMA EIA Regulations (as amended). This section regulates and prescribes the content of the EIA Report and specifies the type of supporting information that must accompany the submission of the EIA Report to the Competent Authority. An overview of where the requirements of Appendix 3 of the 2014 NEMA EIA Regulations (as amended) are addressed in this EIA Report is presented in Table 1.3 below.

As required in Regulation 23 (4) of the 2014 NEMA EIA Regulations (as amended), the EMPr that is required as part of the EIA Process is provided in Appendix I and Appendix J of this EIA Report. The EMPr for the Solar PV and associated infrastructure (Appendix I of the EIA Report) has been structured to comply with the requirements outlined in Appendix 4 of the 2014 NEMA EIA Regulations (as amended). The EMPr for the on-site substation complex (Appendix J of the EIA Report) complies with the Generic EMPr for substations published in GN 435 in March 2019.

Furthermore, this process has been designed to satisfy the requirements of Regulations 41, 42, 43 and 44 of the 2014 NEMA EIA Regulations (as amended) relating to the PPP and, specifically, the registration of and submissions from I&APs.

As noted above, the Draft EIA Report was being made available to registered I&APs, Organs of State and key relevant stakeholders for a 30-day comment period extending from 2 June 2023 to 3 July 2023 (excluding public holidays). All comments received during the 30-day comment period on the Draft EIA Report have been incorporated into the Comments and Responses Report and addressed, as applicable and where relevant, and is included in Appendix H.7 of this Final EIA Report that has submitted to the DFFE for decision-making (i.e. approval or refusal) in line with Regulation 24 of GN R326.

**Table 1.3: Compliance with Appendix 3 of the 2014 NEMA EIA Regulations
(as amended)**

Section of the EIA Regulations	Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)	Chapter / Appendix
Appendix 3 - (3) (1) (a)	Details of - i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	Chapter 1, Appendix A and Appendix B
Appendix 3 - (3) (1) (b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, 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;	Chapter 1, Chapter 2, Chapter 3, Chapter 20, Appendix C
Appendix 3 - (3) (1) (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;	Chapter 1, Chapter 2, Chapter 3, Chapter 20, Appendix C

ENVIRONMENTAL IMPACT ASSESSMENT REPORT: Scoping and Environmental Impact Assessment (EIA)
Process for the Proposed Development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and
associated infrastructure, near De Aar, Northern Cape Province

Section of the EIA Regulations	<u>Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)</u>	Chapter / Appendix
Appendix 3 - (3) (1) (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;	Chapter 2 and Chapter 4
Appendix 3 - (3) (1) (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;	Chapter 4 and Chapters 6 to 17
Appendix 3 - (3) (1) (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 development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 1 and Chapter 5
Appendix 3 – (3) (1) (g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 5
Appendix 3 – (3) (1) (h)	A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including – i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; 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; ix. if no alternative development footprints for the activity were investigated, the motivation for not considering such; and x. a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 5
Appendix 3 - (3) (1) (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 development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including – i. a description of all environmental issues and risks that were identified during the environmental impact assessment 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;	Throughout Chapters 6 - 19
Appendix 3 – (3) (1) (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	Throughout Chapters 6 – 19

ENVIRONMENTAL IMPACT ASSESSMENT REPORT: Scoping and Environmental Impact Assessment (EIA)
Process for the Proposed Development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and
associated infrastructure, near De Aar, Northern Cape Province

Section of the EIA Regulations	<u>Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)</u>	Chapter / Appendix
	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;	
Appendix 3 – (3) (1) (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;	Chapter 20
Appendix 3 – (3) (1) (l)	An environmental impact statement which contains: <ul style="list-style-type: none"> 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 development footprint on the approved site as contemplated in the accepted scoping report 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; 	Chapters 6 to 19, Chapter 20 and Appendix I and Appendix J
Appendix 3 – (3) (1) (m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapters 6 to 19, Chapter 20 and Appendix I and Appendix J
Appendix 3 – (3) (1) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Chapters 5 to 19, Chapter 20 and Appendix I and Appendix J
Appendix 3 – (3) (1) (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;	Chapters 6 to 17 and Chapter 20
Appendix 3 – (3) (1) (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapters 6 to 17 and Chapter 20
Appendix 3 – (3) (1) (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;	Chapter 20
Appendix 3 – (3) (1) (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;	Not Applicable
Appendix 3 - (3) (1) (s)	An undertaking under oath or affirmation by the EAP in relation to - <ul style="list-style-type: none"> ii. the correctness of the information provided in the reports; iii. the inclusion of comments and inputs from stakeholders and interested and affected parties; iv. the inclusion of inputs and recommendations from the specialist reports where relevant; and v. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; 	Appendix B
Appendix 3 – (3) (1) (u)	An indication of any deviation from the approved scoping report, including the plan of study, including - <ul style="list-style-type: none"> i. any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and ii. a motivation for the deviation; 	Not applicable
Appendix 3 - (3) (1) (v)	Any specific information that may be required by the competent authority; and	Information requested by the DFFE during comment periods, and acceptance of the Final Scoping Report have been addressed throughout the report, as relevant
Appendix 3 - (3) (1) (w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Throughout the report

CHAPTER 1 - INTRODUCTION

ENVIRONMENTAL IMPACT ASSESSMENT REPORT: Scoping and Environmental Impact Assessment (EIA)
 Process for the Proposed Development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and
 associated infrastructure, near De Aar, Northern Cape Province

Section of the EIA Regulations	<u>Requirements for an Environmental Impact Assessment Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982, as amended in GN R326)</u>	Chapter / Appendix
Appendix 3 - (3) (2)	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	Not applicable in terms of the actual EIA Report, but various gazetted assessment and reporting protocols have been complied with for the specialist assessments. Refer to Chapter 4, Chapters 6 to 19, and Chapter 20 of this EIA Report.



CHAPTER 2: Project Description





CONTENTS

2. PROJECT DESCRIPTION	2-3
2.1 Definition of Project Study Area	2-3
2.2 Project Locality and Co-ordinates	2-6
2.3 Key components of the proposed project	2-7
2.3.1 Solar PV Facilities – Solar Field	2-12
2.3.2 Infrastructure within the PV Facility	2-13
2.3.2.1 Inverters, Low Voltage Cables, and Medium Voltage Cables	2-13
2.3.2.2 On-site Substation Complex	2-14
2.3.2.3 Battery Energy Storage System	2-14
2.3.2.4 Internal Roads	2-16
2.3.2.5 Panel Maintenance and Cleaning Area	2-17
2.3.2.6 Storm water	2-17
2.3.2.7 Auxiliary Building Infrastructure	2-17
2.3.2.8 Additional Infrastructure	2-18
2.3.3 External Access Roads	2-18
2.3.4 Service Provision	2-21
2.3.4.1 Water Usage	2-21
2.3.4.2 Sewage or Liquid Effluent	2-23
2.3.4.3 Solid Waste Generation	2-23
2.3.4.4 Electricity Requirements	2-24
2.4 Socio-Economic	2-24
2.4.1 Employment during Construction	2-24
2.4.2 Employment during Operations	2-24
2.4.3 Socio-Economic Investment and Development	2-24
2.5 Overview of the Project Development Cycle	2-25
2.5.1 Planning and Design Phase	2-25
2.5.2 Construction Phase	2-26
2.5.3 Operational Phase	2-27
2.5.4 Decommissioning Phase	2-27

TABLES

Table 2.1: Farm Properties forming the study area.	2-3
Table 2.2: Affected Farm Properties for the proposed project.	2-6
Table 2.3: Co-ordinates of the proposed project.	2-7
Table 2.4: Co-ordinates of the road to the fence line of the PV Facility.	2-7
Table 2.5: Description of the components of the proposed project.	2-7

FIGURES

Figure 2.1: A) Evolution of the Study Area / Preferred Site into the Scoping Buildable Areas / development footprints; B) Detailed view of the Project Study Area / Preferred Site, Original Scoping Buildable Areas and finalised Buildable Areas (development footprints).	2-5
Figure 2.2: Affected and Adjacent Farm Portions for the study area.	2-6
Figure 2.3: Schematic overview of the Kudu Solar Facilities and EGI Connection.	2-11
Figure 2.4: Components of the Proposed PV Installation.	2-12
Figure 2.5: Example of PV Technology (Department of Environment, Forestry and Fisheries (DEFF), 2019).	2-13
Figure 2.6: Example of PV Technology with Lithium Ion BESS (ARENAWIRE, 2018).	2-15
Figure 2.7: Schematic diagram of a typical Redox Flow Battery (Source: Parsons, 2017 ⁴).	2-16
Figure 2.8: Proposed Access Routes to the study area (Sturgeon Consulting, 2023).	2-19
Figure 2.9: Potential Access Route Option 1: Divisional Road 3093 (Photograph taken from the R48) (Sturgeon, 2023).	2-19
Figure 2.10: Potential Access Route Option 2: Main Road 790 (Photograph taken from the R48) (Sturgeon, 2023).	2-20
Figure 2.11: Potential Access Route Option 3: Divisional Road 3096 (Photograph taken from the R48) (Sturgeon, 2023).	2-20
Figure 2.12: Detailed Layout for Kudu Solar Facility 1.	2-26

2. PROJECT DESCRIPTION

This chapter provides an overview of the conceptual project design and technology for the proposed Kudu Solar Facility 1 and associated infrastructure.

The purpose of this chapter is to present sufficient project information on the proposed project to inform the Scoping and Environmental Impact Assessment (EIA) Process in terms of design parameters applicable to the project.

As noted in Chapter 1 of this EIA Report, 12 Solar Photovoltaic (PV) power generation facilities and associated Electrical Grid Infrastructure (EGI) are being proposed north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province. The Solar PV Facilities are referred to as Projects 1 to 12, and the related EGI projects are referred to as Projects 13 to 26. Separate EIA Reports have been compiled for each Solar Facility. This EIA Report only addresses **Project 1** (i.e. Kudu Solar Facility 1 and associated infrastructure) (hereafter referred to as the “Kudu Solar Facility” or “proposed project”).

In terms of the EGI projects (i.e. Projects 13 to 26), these address the proposed grid connection from the proposed Kudu Solar Facilities to the nearby Eskom Hydra-Perseus 400 kV Overhead Power Line; and separate Basic Assessment (BA) Processes and/or adoption of the EGI Standard (Government Gazette 47095; Government Notice (GN) 2313, dated 27 July 2022) will be followed for these projects.

2.1 Definition of Project Study Area

The **study area or preferred site** for all the proposed Kudu Solar Facilities is the **full extent** of the **eight affected farm properties** on which the proposed PV Facilities are planned to be constructed. These farm properties¹ are listed in Table 2.1. The full extent of these properties has been assessed by the specialists to identify environmental sensitivities and no-go areas. The preferred site or **total study area** for all the Kudu Solar Facilities is approximately **8 150 hectares (ha)**. The preferred site serves as the study area for this Scoping and EIA Process. Therefore, the terms “site” and “study area” are used synonymously in this report.

Table 2.1: Farm Properties forming the study area.

FARM PORTION	SG CODE
Remaining Extent of the Farm Bas Berg No. 88	C05700000000008800000
Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	C05700000000008800003
Portion 4 (Portion of Portion 3) of the Farm Bas Berg No. 88	C05700000000008800004
Remaining Extent of Portion 2 (Middel Plaats) (a Portion of Portion 1) of the Farm Grasspan No. 40	C05700000000004000002
Remaining Extent of the Farm Annex Wolve Kuil No. 41	C05700000000004100000
Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41	C05700000000004100001
Portion 2 of the Farm Wolve Kuil No. 43	C05700000000004300002
Remaining Extent of the Farm Wolve Kuilen No. 42	C05700000000004200000

¹ The farm property details are based on the information captured in the Title Deeds. All references made to these properties in this report should be considered as such.

At the commencement of this Scoping and EIA Process, the **Original Scoping Buildable Areas** which fall within the study area / preferred site, were identified by the Project Applicant following the completion of high-level environmental screening based on the Screening Tool. The Scoping Buildable Areas serve as the “development footprints” for the 12 proposed PV facilities and fall within the preferred site / study area.

As part of the Scoping Phase, the specialists assessed and considered the entire study area / preferred site, which included the Original Scoping Buildable Areas.

Following the identification of sensitivities by the specialists and relevant specialist fieldwork during the Scoping Phase, the Project Developer took such sensitivities, and other considerations, into account and formulated the Revised Scoping Buildable Areas or development footprints for the proposed 12 x PV areas. The Revised Scoping Buildable Areas have been used to inform the design of the layout and have been further assessed during this EIA Phase in order to identify the preferred development footprint of the proposed project on the approved site as contemplated in the accepted Scoping Report. The development footprint is where the actual development will be located, i.e. the footprint containing the PV solar arrays and associated infrastructure. The buildable areas are the full extent to be approved for development, and the development footprint detailed in the layouts is based on the current proposal.

In summary, the full extent of the study area has been assessed by the specialists and mapped accordingly in the Specialist Assessments to identify environmental sensitivities and no-go areas. This approach uses environmental and social constraints to avoid sensitive features, thus applying mitigation hierarchy thinking, and it leads to the selection of the least sensitive development footprint.

Changes to the detailed layouts are deemed acceptable if the changes remain within the approved buildable areas / development footprints and area assessed during the Scoping and EIA Process with no-go sensitive areas avoided.

Figure 2.1 provides an indication of the Scoping Buildable Areas, development footprints, as well as the study area, and its evolution.

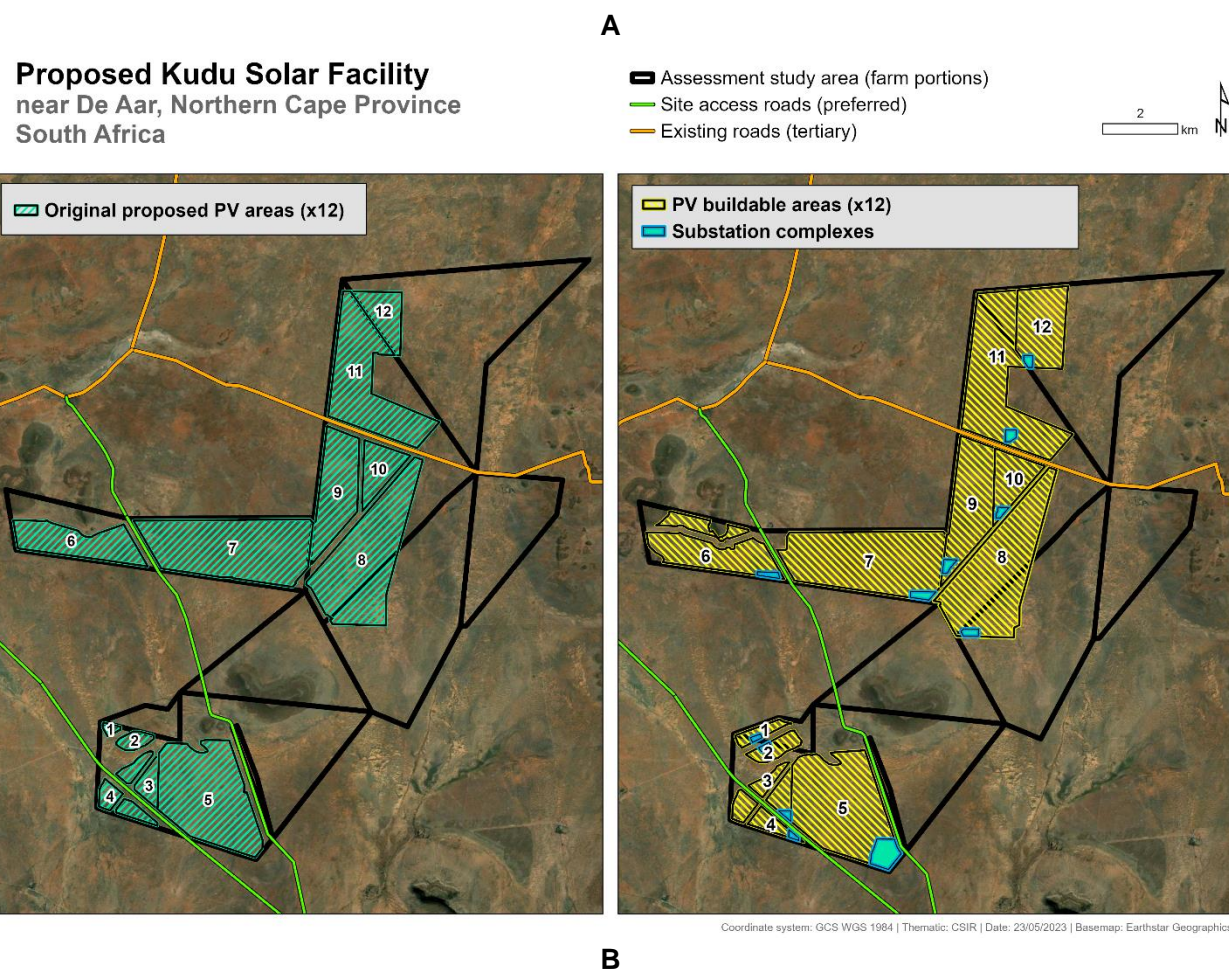
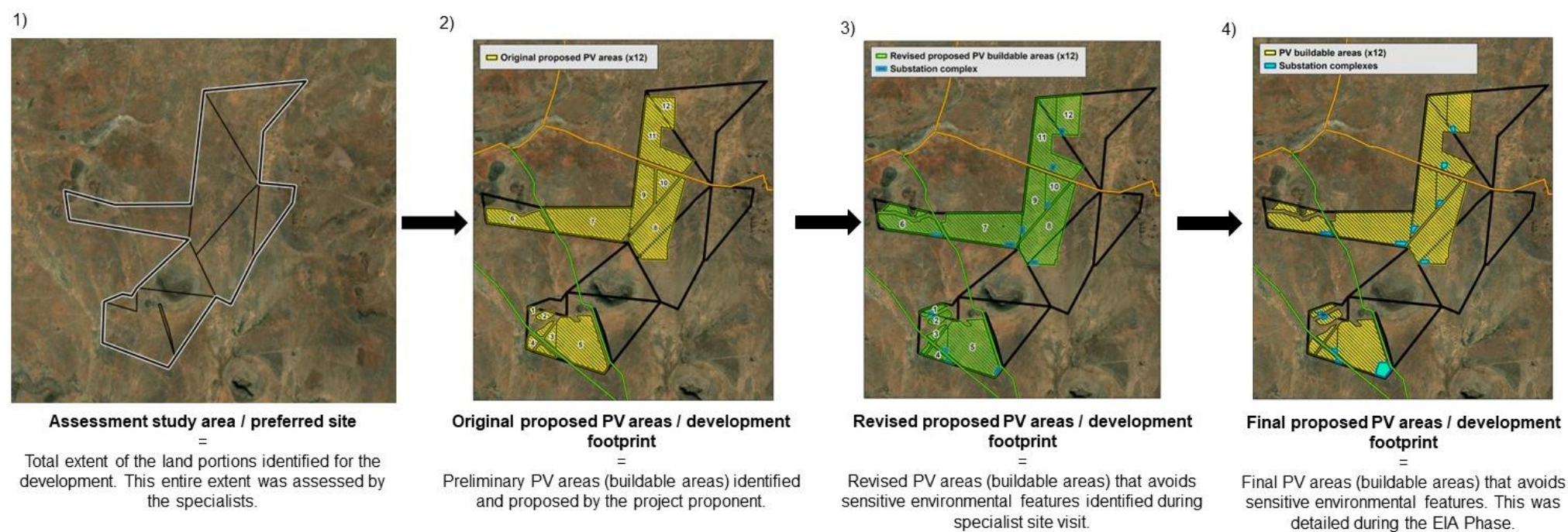


Figure 2.1: A) Evolution of the Study Area / Preferred Site into the Scoping Buildable Areas / development footprints; B) Detailed view of the Project Study Area / Preferred Site, Original Scoping Buildable Areas and finalised Buildable Areas (development footprints).

2.2 Project Locality and Co-ordinates

Refer to Chapter 1 for a locality map of the proposed Kudu Solar Facilities and associated infrastructure. Refer to Appendix C of this EIA Report for additional maps.

The proposed project and associated infrastructure will occur on the farm portions listed in Table 2.2 below, which also specifies the corresponding 21-digit Surveyor General code for each affected farm portion. The properties to be affected by the development of the proposed project will be leased from the property owners by the Project Applicant for the life span of the proposed project.

Table 2.2: Affected Farm Properties for the proposed project.

Farm Portion	21-digit Surveyor General code
Remaining Extent of the Farm Bas Berg No. 88	C05700000000008800000
Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	C05700000000008800003

Figure 2.2 provides an indication of the affected farm portions and the adjacent farm portions for the entire study area.

Proposed Kudu Solar PV facility (1 - 12) near De Aar, Northern Cape Province South Africa

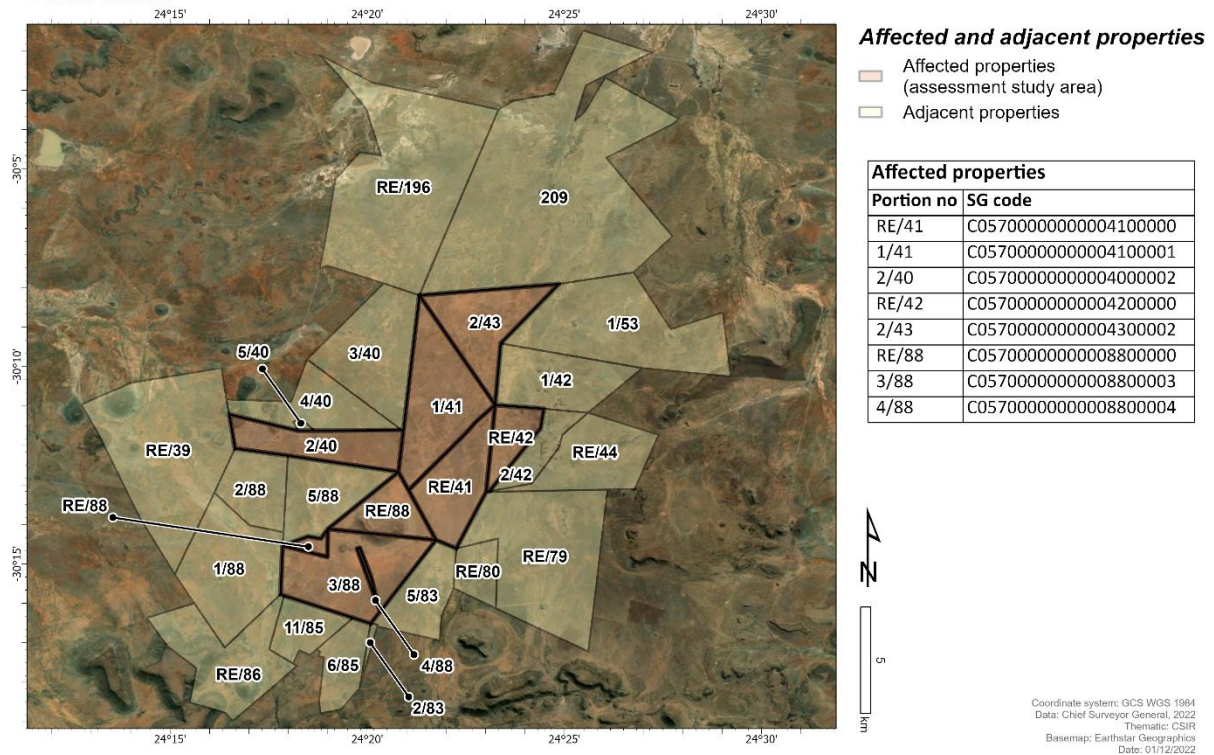


Figure 2.2: Affected and Adjacent Farm Portions for the study area.

The co-ordinates of the corner points of the proposed project are detailed in Table 2.3.

Table 2.3: Co-ordinates of the proposed project.

Point Number	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
1	-30.23982627	24.3114012	30° 14' 23.37455688" S	24° 18' 41.04432175" E
2	-30.24012825	24.31013928	30° 14' 24.46168926" S	24° 18' 36.50139977" E
3	-30.245673	24.2994885	30° 14' 44.42281521" S	24° 17' 58.15859276" E
4	-30.2448309	24.29871616	30° 14' 41.39125748" S	24° 17' 55.37817620" E
5	-30.24314195	24.29802111	30° 14' 35.31100299" S	24° 17' 52.87601180" E
6	-30.24263716	24.29804233	30° 14' 33.49376952" S	24° 17' 52.95239012" E
7	-30.23888684	24.30833937	30° 14' 19.99263036" S	24° 18' 30.02174626" E
8	-30.23895737	24.30874806	30° 14' 20.24654664" S	24° 18' 31.49303051" E
9	-30.2393944	24.30954012	30° 14' 21.81982831" S	24° 18' 34.34444046" E

Co-ordinates of the proposed new access road from the closest existing main road to the fence line of the PV facility are shown in Table 2.4 below. The co-ordinates include the sections of existing unnamed farm gravel roads for the main access to the proposed PV facility. Co-ordinates are not provided for the proposed internal roads within the PV facility as these will occur within the fenced off area, for which co-ordinates are provided in Table 2.3.

Table 2.4: Co-ordinates of the road to the fence line of the PV Facility.

Point Number	Decimal Degrees		Degrees, Minutes, Seconds	
	Latitude (Y)	Longitude (X)	Latitude (S)	Longitude (E)
1	-30.24885901	24.29453346	30° 14' 55.89245302" S	24° 17' 40.32047373" E
2	-30.24670704	24.29926377	30° 14' 48.14535220" S	24° 17' 57.34957023" E
3	-30.24406257	24.30267668	30° 14' 38.62524442" S	24° 18' 09.63604473" E
4	-30.24480781	24.30308059	30° 14' 41.30812093" S	24° 18' 11.09010691" E

2.3 Key components of the proposed project

The proposed project will consist of the key components listed below in Table 2.5. A summary of the key components of the proposed project and technical information is described in this section.

Table 2.5: Description of the components of the proposed project.

Component	Description
Solar Field	
Type of Technology	Solar Photovoltaic (PV) Technology
Generation Capacity (Maximum Installed)	<ul style="list-style-type: none"> Up to 50 MWac
Total developable area that includes all associated infrastructure within the fenced off area of the PV facility	<ul style="list-style-type: none"> Approximately 34 ha
PV Panel Structure (with the following possible tracking and mounting systems):	<ul style="list-style-type: none"> <u>Height</u>: Approximately 3.5 m (maximum)

Component	Description
<ul style="list-style-type: none"> ▪ Single Axis Tracking structures (aligned north-south); ▪ Dual Axis Tracking (aligned east-west and north-south); ▪ Fixed Tilt Mounting Structure; ▪ Mono-facial Solar Modules; or ▪ Bifacial Solar Modules. 	
Building Infrastructure	
Auxiliary Buildings	<ul style="list-style-type: none"> ▪ <u>Type</u>: These include, but are not limited to, Operation and Maintenance (O&M) building / centre, site office, workshop, staff lockers, bathrooms/ablutions, warehouses, guard houses, etc. ▪ <u>Cumulative Footprint</u>: Approximately up to 5000 m² ▪ <u>Height</u>: Up to 10 m
Inverter/Transformer Stations	<ul style="list-style-type: none"> ▪ <u>Preliminary average number of stations</u>: 27 ▪ <u>Height</u>: Approximately 3 m ▪ <u>Footprint</u>: Approximately 220 m² each
On-site Substation Complex	<ul style="list-style-type: none"> ▪ <u>Components of the on-site substation complex</u>: <ul style="list-style-type: none"> ○ On-site Independent Power Producer (IPP) or Facility Substation (~1 ha)². ○ Solid State Lithium Ion or Redox Flow Battery Energy Storage System. Refer to the details below. ○ Switching Station and Collector Station (~2 ha). This forms part of Projects 13 – 24 and will be assessed as part of separate processes. It is important to mention here for contextualisation (it does not appear in the Application for EA or relevant listed activities). ▪ <u>Footprint of the on-site substation complex</u>: Up to approximately 8 ha ▪ <u>Height of the on-site substation complex</u>: Up to 10 m ▪ <u>Capacity of the on-site substation complex</u>: This varies according to the detailed design and requirements from potential clients, however a capacity stepping up from 22 kV or 33 kV to 132 kV is estimated.
Associated Infrastructure	

² As confirmed with the DFFE, the on-site substation complex can be included within the current Application for EA.

Component	Description
Battery Energy Storage System (BESS)	<ul style="list-style-type: none"> ▪ <u>Technology</u>: Solid State Lithium-Ion BESS or Redox Flow BESS (both options have been considered in the Scoping and EIA Process) ▪ <u>Footprint</u>: Approximately 1 ha ▪ <u>Height</u>: Up to 10 m ▪ <u>Capacity</u>: Up to 500 MW / 500 MWh
On-site medium voltage internal cables	<ul style="list-style-type: none"> ▪ <u>Placement</u>: Underground or above ground in certain sections ▪ <u>Capacity</u>: 22 or 33 kV ▪ <u>Depth</u>: Maximum depth of 1.5 m
Underground low voltage cables or cable trays	<ul style="list-style-type: none"> ▪ <u>Depth</u>: Maximum depth of 1.5 m
Access roads (including upgrading and widening of existing roads, where relevant)	<ul style="list-style-type: none"> ▪ <u>Details</u>: Existing roads will be used as far as practically achievable to access the site. The Traffic Specialist has noted that the main roads leading to the proposed project site are of a sufficient width. However, upgrading of the main access point from the R48 will be required. This is specifically at the intersection of the TR38/01 (i.e. R48) and DR3093, which will require an existing island of approximately 60 m² to be removed and surfaced to accommodate the turning movements of vehicles.
Internal roads	<ul style="list-style-type: none"> ▪ <u>Details</u>: New internal service roads will need to be established (i.e. new roads within the fenced off area of the PV Facility, and new roads between the closest existing road and the PV Facility to gain access). These would either comprise farm roads (compacted dirt/gravel) or paved roads. ▪ <u>Width</u>: <ul style="list-style-type: none"> ○ Within the PV Facility: Up to 5 m ○ Between the existing road and PV Facility: Up to 8 m
Fencing around the PV Facility Perimeter	<ul style="list-style-type: none"> ▪ <u>Type</u>: Could be palisade, mesh or fully electrified. A single perimeter fence is proposed around the PV Facility. ▪ <u>Height</u>: Up to 3 m
Storm water channels	<ul style="list-style-type: none"> ▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Panel cleaning and maintenance area	<ul style="list-style-type: none"> ▪ The type of panels to be used (and panel cleaning) will be confirmed during detailed design/engineering phase. The panel cleaning and maintenance area will form part

Component	Description
	of the O&M Auxiliary Buildings (located at the on-site substation complex).
Work area during the construction phase (i.e. laydown area)	<ul style="list-style-type: none"> ▪ Temporary Laydown: Up to 7 ha. ▪ The need for a permanent laydown area will be confirmed during the detailed design/engineering phase.
Water Requirements	<ul style="list-style-type: none"> ▪ Approximately 9 000 m³ of water is estimated to be required per year for the construction phase. ▪ Approximately 1 000 m³ of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are unknown at this stage, however they are expected to be similar to the construction phase. ▪ Potential sources: Local municipality, third-party water supplier, existing boreholes or drilled boreholes on site.
Construction Period	<ul style="list-style-type: none"> ▪ 12 – 18 months
Operational Period	<ul style="list-style-type: none"> ▪ Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 years.

Figure 2.3 provides a **schematic** overview (not to scale) of the proposed Kudu Solar Facilities cluster. The EGI projects that consist of the following will be subjected to separate BA processes and/or application of the EGI Standard, as noted above:

- Switching Stations and Collector Stations at each On-Site Substation Complex;
- 132 kV Overhead Power Line from each Kudu Solar Facility to the proposed Collector Station(s) or up to the proposed independent Main Transmission Substation (MTS);
- Independent 132 kV/400 kV MTS and associated infrastructure; and
- 400 kV Loop-In-Loop-Out (LILO) from the existing Hydra-Perseus 400 kV Overhead Power Line to the proposed MTS.

A description of the key components of the proposed project is described below.

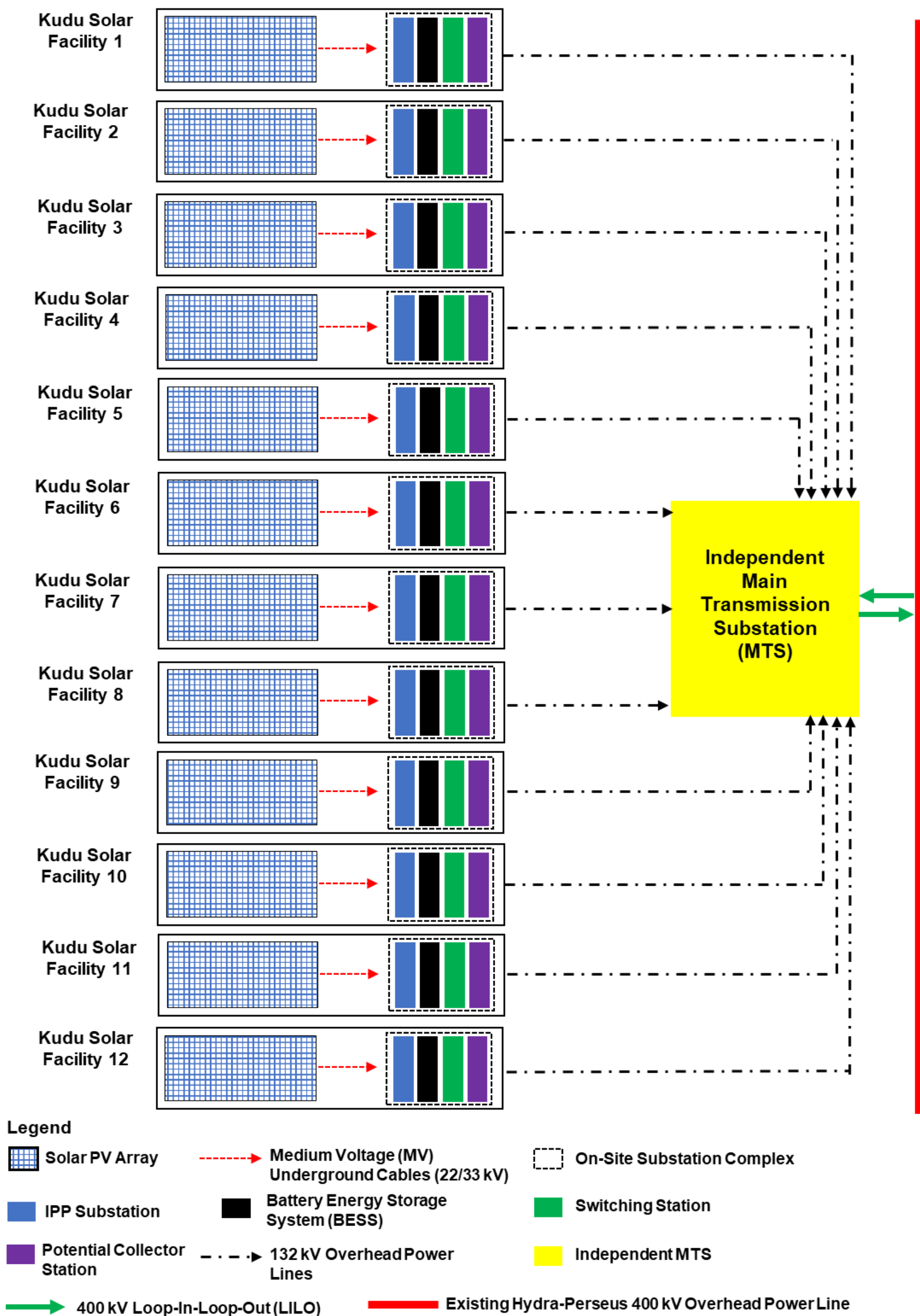


Figure 2.3. Schematic overview of the Kudu Solar Facilities and EGI Connection.

2.3.1 Solar PV Facilities – Solar Field

The Solar Field will consist of the solar arrays (panels) and building infrastructure.

The total developable area that includes all associated infrastructure within the fenced off area of the PV facility i.e. including the solar field, foundations, buildings and associated infrastructure but excluding access roads leading to the fenced off area, for the proposed project is **34 ha**.

The smallest unit of a PV installation is a cell. A number of cells form a module, and several modules cumulatively form the arrays (Figure 2.4). An example of a Solar PV Facility is provided in Figure 2.5.

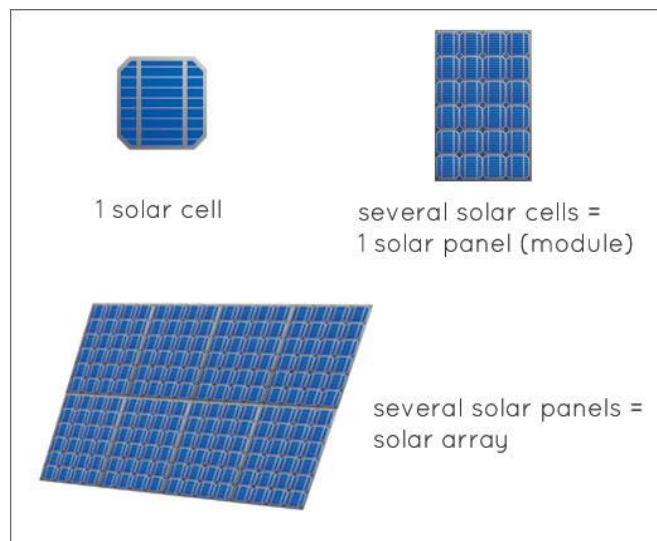


Figure 2.4. Components of the Proposed PV Installation.

Modules are arranged into strings that form the solar field, and are installed on racks which are made of aluminium or galvanised steel. Foundations will likely be drilled and concreted into the ground. The entire structure will have a maximum height of approximately 3.5 m (measured from the ground). This system may be fixed, or may track the movement of the sun, either by adopting Single Axis Tracking (aligned north-south), Dual Axis Tracking (aligned east-west and north-south), Fixed Tilt Mounting Structures, Mono-facial Solar Modules, or Bifacial Solar Modules. Bifacial panels can be up to 20 - 40 % more effective since it also utilises solar radiation reflected from the surfaces onto the rear side of the panels. The tracker design will be confirmed during the detailed engineering phase. All tracker design options have been considered in this Scoping and EIA Process.



Figure 2.5. Example of PV Technology (Department of Environment, Forestry and Fisheries (DEFF), 2019³).

2.3.2 Infrastructure within the PV Facility

2.3.2.1 Inverters, Low Voltage Cables, and Medium Voltage Cables

The solar arrays are typically connected to each other in strings, which are in turn connected to inverters that convert DC to AC. Each inverter station is expected to extend approximately 3 m in height, with a footprint of approximately 0.02 ha. It is estimated that there will be an average of 27 inverter stations at the PV Facility.

The strings will be connected to the inverter stations by low voltage underground (internal) DC cables (to a maximum depth of 1.5 m) or cable trays. Power from the inverter stations will be collected in medium voltage transformers through underground (internal) AC cables or cable trays.

The inverter stations will in turn be connected to the proposed on-site substation complexes, via medium voltage (22 or 33 kV) internal underground cables. It is highly unlikely that above ground 22 or 33 kV power lines will be utilised due to the shading created to the PV facility from the overhead lines. It is more likely that the 22 or 33 kV internal cables will be underground to a maximum depth of 1.5 m. However, in the isolated event of crossing a feature hindering underground cabling (e.g. a road, topographical or environmental constraint), the reticulation lines may better be suited to be above ground in certain sections. Therefore, both below and above ground routings need to be covered in this Application for EA. This does not trigger Activity 11 of Listing Notice 1, as the internal reticulation will not have “a capacity of more than 33 kV”.

³ Department of Environment Forestry and Fisheries, 2019. Phase 2 Strategic Environmental Assessment for wind and solar PV energy in South Africa. CSIR Report Number: CSIR/SPLA/SECO/ER/2019/0085 Stellenbosch, Western Cape.

2.3.2.2 On-site Substation Complex

The proposed project will also include an on-site substation complex. The on-site substation complex will cover an approximate area of 8 ha, with a height of up to 10 m, and stepping up from 22 kV or 33 kV to 132 kV. The on-site substation complex is planned to include the following:

- On-site Independent Power Producer (IPP) or facility substation;
- Battery Energy Storage System (BESS); and
- Switching Station and Collector Station (see note below regarding this - It is important to mention here for contextualisation (it does not appear in the Application for EA or relevant listed activities)).

The on-site IPP or facility substation will cover an area of approximately 1 ha within the on-site substation complex, and with a maximum height of 10 m. This will include the relevant section that will be maintained by the IPP, focusing on the high voltage infrastructure leading up to the Point of Connection (the Project Applicant's section of the proposed on-site substation complex). As noted above, this will be included in the current Application for EA (i.e. for the Solar PV Facility and associated infrastructure), as confirmed with the DFFE.

The BESS is described in the section below.

The Switching Station and Collector Station forms part of the separate EGI projects (i.e. Projects 13 – 24). The electrical connection from the on-site substation complex to the proposed independent MTS and national grid will be discussed in a separate authorisation and/or registration process (i.e. for Projects 13 to 26).

2.3.2.3 Battery Energy Storage System

The BESS will extend up to 1 ha at the on-site substation complex, with a height of up to 10 m, and a capacity of up to 500 MW / 500 MWh.

Battery storage offers a wide range of advantages to South Africa including electricity supply reliability and quality improvement. The main purpose of the BESS is to mitigate intermittency of solar PV energy by storing and dispatching of electricity when needed i.e. to contribute to the grid 24 hours/day, during peak demand at night or during power outages. In essence, this technology allows renewable energy to enter the completely independent power generation market.

The BESS technology type will either be Solid State Lithium-Ion or Redox Flow. Both these technologies have been assessed during the Scoping and EIA Phase. It was originally planned to motivate for both technology types to be potentially authorised. However, as part of the acceptance of the Final Scoping Report, the Department of Forestry, Fisheries and the Environment (DFFE) noted that only one technology type can be authorised (should such authorisation be granted). **Refer to more information in Chapter 5 and Chapter 20 of this EIA Report for additional information on the preferred BESS technology type.** Additional information on the BESS technologies that have been considered is provided below.

- **Solid State Lithium-Ion Batteries**

Solid State Lithium-Ion batteries are solid state, sealed systems i.e. pre-assembled off site and then delivered to site for placement as per specifications of the supplier. This BESS system consists of multiple battery cells that are assembled together to form modules. A module may consist of several cells working in conjunction. Each cell contains a positive electrode, a negative electrode and an electrolyte. The negative electrode for a lithium-ion cell is typically carbon. The positive electrode can be lithium iron phosphate or a lithium metal oxide. The electrolyte is usually a lithium salt dissolved in an organic solvent (CSIR, 2015⁴).

It is proposed that the Lithium-Ion BESS would be housed in containers, with associated operational, safety and control infrastructure. The BESS will be a sealed unit and will remain sealed during operations. Based on various discussions with the DFFE on previous occasions, it has been confirmed that Lithium-Ion BESS is not classified as containers or structures for the development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good. Hence, listed activities pertaining to this aspect in the 2014 NEMA EIA Regulations (as amended) do not apply. Figure 2.6 is an illustration of a 25 MW / 50 MWh Lithium-Ion battery located at the 60 MW Gannawarra Solar Farm in Australia.



Figure 2.6. Example of PV Technology with Lithium Ion BESS (ARENAWIRE, 2018⁵).

- **Redox Flow Batteries (RFB)**

Flow batteries generally comprise of three major components; a cell stack, auxiliary parts and electrolyte storage. The active chemical species in a flow battery are stored mostly externally in above-ground storage tanks, which contain the positive and negative electrolytes separately. The energy is stored in two chemical components, which are dissolved in a liquid to form electrolytes

⁴ CSIR, 2015. Final Environmental Impact Assessment Report for the proposed construction of Gemsbok Solar PV2 75 MW Solar PV facility on the Remaining Extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt, Northern Cape. CSIR Report Number: CSIR/CAS/EMS/ER/2014/0010/B.

⁵ Arenawire (2018). Solar battery storage in Victoria charging up for summer. <https://arena.gov.au/blog/solar-battery-storage-in-victoria-charging-up-for-summer/> [online]. Accessed November 2021.

during operation. The energy density of a RFB is thus dependent on the size of the storage tanks (Parsons, 2017⁶).

A schematic representation of a typical RFB is provided in Figure 2.7.

There are two types of RFB's i.e. a 'true' RFB and a hybrid RFB. In a 'true' RFB the electro-active materials used to store energy remain dissolved in solution. Therefore, the energy is determined by the volumes of electrolyte available. Examples of a 'true' RFB is a Vanadium RFB and iron-chromium systems. Hybrid RFBs deposit at least one chemical species as a solid during the charge cycle, therefore preventing the complete separation of power and energy characteristics (Parsons, 2017⁴).

Examples of electrolytes for RFBs include Hydrochloric Acid and Sulphuric Acid, which are considered as dangerous goods in terms of the 2014 NEMA EIA Regulations (as amended).

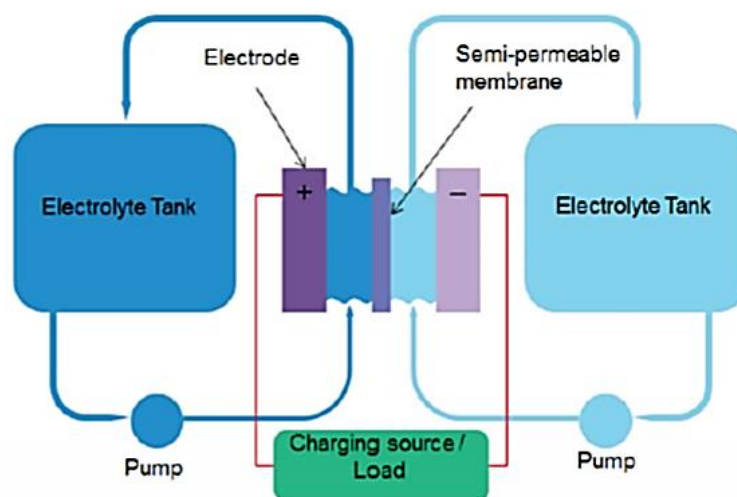


Figure 2.7: Schematic diagram of a typical Redox Flow Battery (Source: Parsons, 2017⁴).

Refer to Chapter 15 of this EIA Report for a BESS High-Level Safety, Health and Environment Risk Assessment. The report provides high level information on the safety, health and environmental risks of the BESS technologies considered during this EIA Process.

2.3.2.4 Internal Roads

New internal roads will also be constructed within the footprint of the PV facility; and between the closest existing road and the PV facility to gain access. These roads will comprise farm roads (compacted gravel/dirt) or paved roads and will extend up to 8 m wide. A perimeter road will also be constructed along the boundary of the proposed PV Facility, which will extend up to 5 m wide.

⁶ Parsons, 2017. US Trade and Development Agency. South Africa Energy Storage Technology and Market Assessment. Order Number: TDA-IE201511210. USTDA Activity Number: 2015-11032A. Parsons Job Number: 640368

2.3.2.5 Panel Maintenance and Cleaning Area

During the operational phase, the accumulation of dust on solar panels generally negatively influences the productivity of solar facilities. As such the panels require regular cleaning. It is proposed that panel cleaning will take place as part of a maintenance schedule, twice per year; however, this may be revised should the site and weather conditions warrant more frequent cleaning. Cleaning may also be required after events that generate significant dust, but not daily. A dedicated panel maintenance and cleaning area will be required on site during the operational phase. The panel cleaning and maintenance area will form part of the O&M Auxiliary Buildings (located at the on-site substation complex). As indicated above, the type of panels to be used (and panel cleaning) will be confirmed during detailed design/engineering phase. Water that emanates from the cleaning process will be free from harmful detergents or will comprise of approved biodegradable substances.

2.3.2.6 Storm water

It is proposed that the area where the solar panels will be installed will not be fully cleared of vegetation. It is planned for the vegetation to be trimmed and the panels will be installed on steel supporting structures above the height of the vegetation. The solar panels will not replace the vegetated area and thus storm water runoff is not expected to increase specifically due to the proposed PV panel placement.

Stormwater infrastructure, such as channels, will be constructed on site to ensure that stormwater run-off from site is appropriately managed. Water from these channels is not likely to contain any chemicals or hazardous substances and will be released into the surrounding environment based on the natural drainage contours.

Details of storm water management are to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed Storm Water Management Plan would need to be developed during the detailed design phase (post EA, should such an authorisation be granted) and to be implemented during all phases of the project. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan should also include the installation of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures promotes the dissipation of storm water run-off. Recommendations for the management of storm water are discussed in the Environmental Management Programme (EMPr).

2.3.2.7 Auxiliary Building Infrastructure

The solar field will require the following auxiliary building infrastructure:

- Warehouse / workshop for storage of equipment;
- Offices;
- Operational and maintenance (O&M) building / control centre;
- Guard Houses / security enclosures;
- Ablution facilities;
- Staff lockers;
- Inverter stations; and
- On-site substation buildings.

The auxiliary buildings will have an estimated cumulative footprint of approximately 5000 m², and a height up to 10 m.

A temporary laydown area with a maximum footprint of 7 ha will also be constructed. The need for a permanent laydown area will be confirmed during the detailed design/engineering phase.

2.3.2.8 Additional Infrastructure

The Project Applicant may establish a concrete batch plant on site (within the laydown area) for purposes of the construction phase. Only a limited amount of water (within the overall water usage estimates described in this chapter) will be utilised during construction for the batching of concrete. Details of the concrete batching plant will be confirmed during detailed design as the development progresses.

For various reasons such as security, public protection and lawful requirements, the proposed built infrastructure on site and the entire PV facility will be secured via the installation of appropriate fencing. The PV facility fencing type could be palisade or mesh or fully electrified, with an estimated height of up to 3 m.

Existing livestock fencing on the affected farm portions may be upgraded in places, where deemed insufficiently secure, whereas permanent fencing will be required around the O&M area and on-site substation complex. Access points will be managed and monitored by an appointed security service provider. The type and height of fencing to be installed will be confirmed during detailed design as the development progresses.

2.3.3 External Access Roads

A Traffic Impact Assessment was commissioned for the proposed Kudu Solar Facilities and is included Chapter 14 of this EIA Report. The following information is based on the Traffic Impact Assessment (Sturgeon Consulting, 2023⁷).

The proposed project study area / preferred site can be accessed via various existing main roads and unnamed farm gravel roads. The potential access routes are discussed below and illustrated in Figure 2.8. Note that these access routes are not alternatives for comparison in terms of the EIA Process, however they are options as part of due diligence by the Project Developer and investigated from a technical viability perspective by the Traffic Specialist.

- **Access Route Option 1 (Figure 2.9):**
 - Route A: Along TR38/01, DR3093, and DR3096;
 - Route B: Along TR38/01, DR3093 and DR3084;
- **Access Route Option 2 (Figure 2.10):**
 - Route A: Along MR790, DR3093 and DR3084;
 - Route B: Along MR790 and DR3093;
 - Route C: Along MR790, DR3093 and DR3096;
- **Access Route Option 3 (Figure 2.11):**
 - Route A: Along TR38/01, TR3802, and DR3096;

⁷ Sturgeon Consulting (2023). Traffic Impact Assessment for the proposed Kudu Solar Facilities and associated infrastructure. Prepared for the Scoping and Environmental Impact Assessment (EIA) for the Kudu Solar Facilities and associated infrastructure.

- Route B: Along TR38/01, TR3802, DR3096 and DR3093; and
- Route C: Along TR38/01, TR3802, DR3096, DR3093 and DR3084.

Access route Option 1 is the preferred main access route for the proposed project. Refer to the Traffic Impact Assessment (Chapter 14 of this EIA Report) for further information on the above roads, as well as the applicability per project.



Figure 2.8: Proposed Access Routes to the study area (Sturgeon Consulting, 2023).



Figure 2.9: Potential Access Route Option 1: Divisional Road 3093 (Photograph taken from the B48) (Sturgeon, 2023).



Figure 2.10: Potential Access Route Option 2: Main Road 790 (Photograph taken from the R48) (Sturgeon, 2023).



Figure 2.11: Potential Access Route Option 3: Divisional Road 3096 (Photograph taken from the R48) (Sturgeon, 2023).

The Traffic Specialist has also noted that, based on preliminary vehicle tracking investigations undertaken during the EIA Phase, the roads leading to the study area are of a sufficient width to accommodate truck movement, however widening by more than 4 m or more than 6 m may be required at localised positions (i.e. intersections) for Access Route Option 2 and Access Route Option 3, as required. For Access Route Option 1, no widening of the intersection at TR38/01 and DR3093 will be required, however, the existing island will need to be removed (approximately 60 m²) and surfaced (i.e. upgraded) to accommodate turning movements. Refer to the Traffic Impact Assessment (Chapter 14 of this EIA Report) for additional specific information in this regard. Refer to Chapter 4 of this EIA Report for additional information on related legislative requirements.

All components fabricated in foreign countries will need to be imported into South Africa via one of the ports. The closest port to the proposed development is the Port of Ngqura, which would result in a route from the port via the N2, then turning north onto the N10 to De Aar.

Another option will be the route from the Port of Cape Town, which follows the N1 from the port and then turns north at Three Sisters onto the N12 to Britstown and then turns east towards De Aar.

The last option will be the route from the Port of Saldanha, which follows the N7 from the port and then turns east past Calvinia and Britstown to De Aar.

In all the above potential route options, from De Aar, the R48 can be taken east up to the proposed site access.

2.3.4 Service Provision

The Project Developer has attempted to consult with the Renosterberg Local Municipality in order to confirm the supply of services (in terms of water usage, sewage removal, solid waste removal, and electricity requirements) for the proposed project. The municipality was also consulted with as part of the 30-day public review period of the Draft Scoping Report, and as part of the 30-day public review period of the Draft EIA Report, to seek comment on the general proposed project. No feedback was obtained from the municipality. Proof of follow up consultation is included in Appendix H.4 of this EIA Report.

Should the local municipality not have adequate capacity available for the handling of waste, provision of water and sewage handling provisions; then the Project Applicant will make use of private contractors to ensure that these services are provided. An outline of the services that will be required are discussed below.

2.3.4.1 Water Usage

During the construction phase, approximately 9 000 m³ of water will be required per year per facility. Water will be required for human consumption and construction activities. This is also classified as potable water and should be from a reputable source and conform to South African National Standards (SANS) quality standards. The decommissioning phase is also expected to result in similar water usage requirements; however, the exact specifications will be confirmed at the time and is not expected to significantly exceed the volume requirements of the construction phase.

During the operational phase, it is estimated that the panel washing process, and human consumption as well as other operational phase activities will require approximately 1 000 m³ of water per year for an approximate 20-year operational lifespan, per facility. This equates to approximately 83 m³ of water per month during the operational phase. The water for panel washing does not need to meet the same quality standards as that required for potable water, however the water should be tested to ensure that it does not negatively impact on the mechanical equipment. Refer to the Geohydrology Assessment (Chapter 16 of this EIA Report) for additional information.

The EMPr has provided recommendations for water conservation techniques during the construction, operational and decommissioning phases. The staff would also be encouraged to use water sparingly during all phases.

Water required for the construction, operational and decommissioning phases will either be sourced from the following sources (in order of priority and likelihood):

- The Renosterberg Local Municipality - specific arrangements will be agreed with the local municipality in a Service Level Agreement (SLA). The water will be trucked in, or made available for collection at the Local Municipal Water Treatment Plant via a metered standpipe. Should the water be trucked in, such impacts have been considered in the Traffic Impact Assessment (Chapter 14 of the EIA Report).
- Investigation into a third-party water supplier which may include private services companies. This would be trucked in, and such impacts have been considered in the Traffic Impact Assessment.
- Existing boreholes on site to source groundwater (if available and if suitable). A Geohydrology Assessment was commissioned as part of this Scoping and EIA Process. The study included an analysis of the hydrocensus chemistry results in terms of the SANS 241-1: 2015 and the Department of Water Affairs and Forestry (DWAf) (1998) Standards. Based on this, the groundwater quality in the study area is generally of good quality in terms of pH, total dissolved solids (TDS) and electrical conductivity (EC). It is possible that the groundwater can be used for potable and domestic purposes with only minor treatment however a full laboratory analysis will be required. With regards to the cleaning of panels, salts could be removed from the groundwater by thermal distillation (i.e. boiling since salt has a much higher boiling point than water) or by membrane separation (commonly reverse osmosis). Both of these techniques are possible but financial viability would have to be determined before commissioning as both techniques are costly on a large scale. Water pipelines may need to be constructed to transfer groundwater from existing boreholes or they may be transported by trucks from the boreholes to the site. Pipelines will fall below the relevant capacity and diameter noted in the Listing Notices of the EIA Regulations. Groundwater may also need to be stored on site in suitable containers or reservoir tanks during the construction and operational phases. Refer to Chapter 4 of this EIA Report for feedback on the authorisations required for this aspect in terms of the National Water Act (Act 36 of 1998, as amended).
- New boreholes that may be drilled on site to source groundwater (if available and if suitable), which will be subject to complete geohydrological testing and an assessment, as well as a Water Use Licence Application process. This will be undertaken as a separate process, once more detailed information becomes available, outside of the current Application for EA for the Solar PV Facility and associated infrastructure. Refer to Chapter 4 of this EIA Report for feedback on the authorisations required for this aspect in terms of the National Water Act (Act 36 of 1998, as amended).

2.3.4.2 Sewage or Liquid Effluent

The proposed project will require sewage services during the construction, operational and decommissioning phases. Low volumes of sewage or liquid effluent are estimated. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a suitable and registered contractor. Permanent ablution facilities may be installed during the operational phase, as indicated above. The effluent may be stored on site in watertight structures (conservancy tanks) and thereafter transported to and disposed of at the Local Municipal sewerage treatment works or similar facility by a registered service provider.

2.3.4.3 Solid Waste Generation

The quantity of waste generated will depend on the construction phase, which is estimated to extend 12 to 18 months. However, it is estimated that approximately 50 m³ of waste will be generated every month during the construction phase. The following waste materials are expected:

- Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts;
- Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals;
- Building rubble, discarded bricks, wood and concrete;
- Domestic waste generated by personnel; and
- Vegetation waste generated from the clearing of vegetation.

Solid waste will be managed via the EMPr during all project phases. The EMPr (Appendix I and Appendix J of this EMPr) incorporates waste management principles. During the construction phase, general solid waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed, emptied into trucks, and disposed at a registered waste disposal facility on a regular or monthly basis by an approved waste disposal Contractor (i.e. a suitable Contractor) or the municipality. In addition, a skip will be placed on site and any damaged or broken PV panels (i.e. those not returned to the supplier) will be stored in this skip. A specialist waste management company will be commissioned to manage and dispose of this waste.

Any hazardous waste (such as contaminated soil as a result of spillages) will be temporarily stockpiled in a designated area on site (i.e. placed in leak-proof storage skips), and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

Waste disposal slips and waybills will be obtained for the collection and disposal of the general and hazardous waste. These disposal slips (i.e. safe disposal certificates) will be kept on file for auditing purposes as proof of disposal. The waste disposal facility selected will be suitable and able to receive the specified waste stream (i.e. hazardous waste will only be disposed of at a registered/licenced waste disposal facility). The details of the disposal facility will be finalised during the contracting process, prior to the commencement of construction. Where possible, recycling and re-use of material will be encouraged.

During the operational phase after construction, the facility will produce minor amounts of general waste (as a result of the offices or maintenance). It is estimated that approximately 1.92 m³ of waste will be generated every month during the operational phase.

2.3.4.4 Electricity Requirements

In terms of electricity supply, the developer may make use of generators on site during construction, and the operational electrical requirements would be nominal and would likely be supplied by the proposed facility.

2.4 Socio-Economic

It should be noted that the employment opportunity specifications provided in this report are estimates and is dependent on the final engineering design and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) Request for Proposal provisions, or similar programme requirements, at that point in time.

2.4.1 Employment during Construction

During the construction phase, skilled, low skilled and semi-skilled temporary employment opportunities will be created. It is difficult to specify the actual number of employment opportunities that will be created at this stage; however, approximately 150 employment opportunities are expected to be created during the construction phase. The skill breakdown of employment opportunities is estimated as 60 % low skilled, 25 % semi-skilled and 15 % skilled.

Employees will most likely be housed in local nearby towns and villages. Typically, the EPC contractor will be responsible for the provision of transport of construction personnel to and from site.

2.4.2 Employment during Operations

Approximately 8 full time employment opportunities will be created during the operational phase. The employment breakdown is estimated as 70 % low skilled, 25 % semi-skilled and 5 % skilled. The low and semi-skilled jobs will be linked to services such as panel cleaning, maintenance and security. The percentage of temporary workers that may be offered permanent employment once the construction phase is completed will be dependent on the investor requirements, however will meet the requirements of the REIPPPP (or similar process) at the time as well.

2.4.3 Socio-Economic Investment and Development

The Applicant will ultimately own the project, if successful, and will compile an Economic Development Plan which will be compliant with REIPPPP requirements (or similar process) and will inter alia set out to achieve the following:

- Create a local community trust or similar (as required by REIPPPP) which has an equity share in the project life to benefit historically disadvantaged communities;
- Initiate a skills development and training strategy to facilitate future employment from the local community;
- Give preference to local suppliers for the construction of the facility; and

- Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.

2.5 Overview of the Project Development Cycle

This section provides an outline of the main activities that are proposed during each phase of the proposed project, i.e. extending from the Planning and Design phase through to the Decommissioning phase. The operational life of the PV Facility is expected to be approximately 20 years, which could be extended through regular maintenance and/or upgrades in technology.

The project can be divided into the following main phases:

- Detailed Planning and Design Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts, which have been assessed as part the EIA Phase.

2.5.1 Planning and Design Phase

The detailed project layout, including the exact placement of building infrastructure and the internal road network has been identified during the EIA Phase. The project layout has been informed by the findings of the specialist assessments. The specialists have reviewed the detailed project layout. The panel mounting system will only be confirmed during the detailed design. The detailed layout is included in Figure 2.12 of this chapter, and also included in Appendix C of this EIA Report. Comments made by the DFFE during the Scoping Phase and upon acceptance of the Final Scoping Report, and during the review of the Draft EIA Report have been taken into consideration in the project layout, as best as possible. All efforts have been made by ABO Wind to provide as much detail as possible for the layout maps during the EIA Phase. Other layout features will be identified during the detailed design/engineering phase. Any changes to the layout post EA (should such be granted), will be undertaken via a relevant EA Amendment process. However, as noted above, any changes to the layout are regarded acceptable if they fall within the assessed study area and buildable areas, and they avoid no-go sensitivities identified by the specialists.

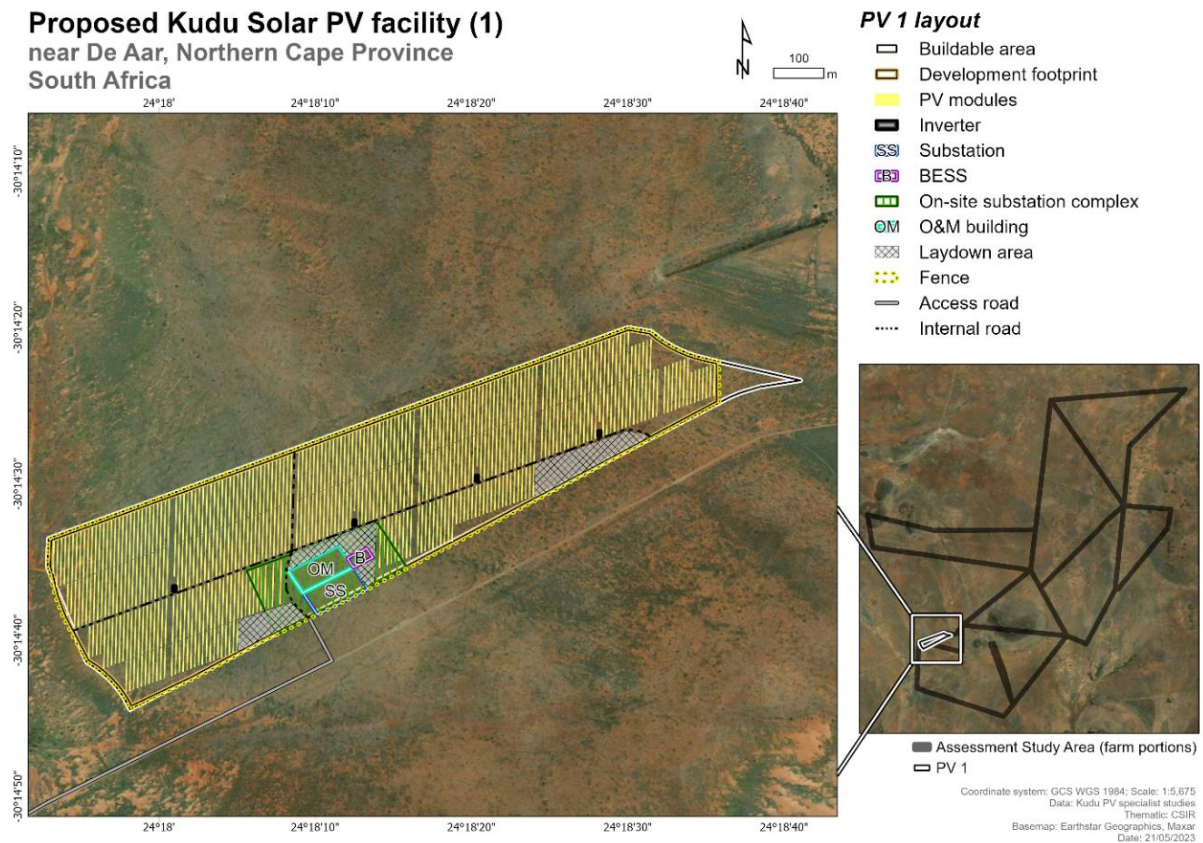


Figure 2.12: Detailed Layout for Kudu Solar Facility 1.

2.5.2 Construction Phase

The construction phase will take place subsequent to the issuing of the EA (should such authorisation be granted) and if a successful bid in terms of the REIPPPP or a similar tender process is issued, and once a power purchase agreement (PPA) is signed with a suitable energy off-taker (either national government or private). As indicated above, the construction phase is expected to extend 12 to 18 months. The main activities that will form part of the construction phase are:

- Removal of vegetation for the proposed infrastructure, where necessary, within the approved development footprint to facilitate the construction and/or establishment of infrastructure. Note that vegetation is planned to be trimmed within the PV array area (and not removed completely);
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation, where necessary (except for the PV array);
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, and additional infrastructure.

All efforts will be made to ensure that construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the EMPr. An independent Environmental Control Officer (ECO) will be appointed during the construction phase and will monitor compliance with the recommendations and conditions of the EMPr and EA, respectively.

2.5.3 Operational Phase

The following activities will occur during the operational phase:

- The generation of electricity from the proposed solar facility; and
- Maintenance of the solar field and associated infrastructure.

The operational lifespan of the proposed solar PV facility is expected to be approximately 20 years. During the life span of the proposed project, on-going maintenance will be required on a scheduled basis to ensure the continued optimal functioning of the infrastructure. In general, maintenance on the structures will involve visual inspection, and only equipment that fails will be replaced in manner similar to that of construction activities. The EMPr includes the requirement for method statements to be compiled prior to the operational phase to describe the manner in which maintenance will be undertaken to ensure environmental impacts are minimised.

2.5.4 Decommissioning Phase

At the end of the operational phase, the PV facility may be decommissioned, or may be repowered i.e. redesigned and refitted so as to operate for a longer period. The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise i.e. if the facility becomes outdated or the land needs to be used for other purposes, the decommissioning procedures will be undertaken in line with an approved EMPr and relevant legislation at the time, and the site will be rehabilitated and returned to its pre-construction state.



CHAPTER 3: Description of the Affected Environment



CONTENTS

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT	3-5
3.1 Background, Study Area, and Buildable Areas	3-6
3.2 Biophysical Environment	3-8
3.2.1 Climate and Climate Change	3-8
3.2.1.1 General Context	3-8
3.2.1.2 Climate Change	3-11
3.2.2 Topography and Landscape	3-12
3.2.3 Geology	3-12
3.2.4 Agriculture and Land Capability	3-13
3.2.4.1 General Context	3-13
3.2.4.2 Screening Tool Descriptions and Site Sensitivity Verification	3-13
3.2.5 Geohydrology	3-15
3.2.5.1 Regional and Site-Specific Information	3-15
3.2.5.2 Screening Tool Descriptions and Site Sensitivity Verification	3-21
3.2.6 Strategic Water Source Areas	3-21
3.2.7 Aquatic Biodiversity	3-22
3.2.7.1 General Context	3-22
3.2.7.2 Screening Tool Descriptions and Site Sensitivity Verification	3-24
3.2.8 Terrestrial Biodiversity	3-26
3.2.8.1 Regional Vegetation	3-26
3.2.8.2 Biodiversity Conservation Planning	3-27
3.2.8.3 Fauna	3-31
3.2.8.4 Habitats and Terrestrial Plant Species	3-31
3.2.8.5 Screening Tool Descriptions and Site Sensitivity Verification	3-32
3.2.9 Avifauna	3-34
3.2.9.1 Screening Tool Descriptions and Site Sensitivity Verification	3-35
3.2.10 Visual Aspects and Sensitive Receptors	3-35
3.2.10.1 Screening Tool Descriptions and Site Sensitivity Verification	3-36
3.2.11 Heritage: Archaeology and Cultural Landscape	3-37
3.2.11.1 Screening Tool Descriptions and Site Sensitivity Verification	3-37
3.2.12 Palaeontology	3-38
3.2.12.1 Screening Tool Descriptions and Site Sensitivity Verification	3-39
3.3 Socio-Economic Environment	3-40
3.3.1 Regional Context – Pixley ka Seme District Municipality	3-40
3.3.1.1 Demographics and Economic Profile	3-40
3.3.1.2 Social Characteristics	3-41
3.3.2 Local Context – Renosterberg Local Municipality	3-41

3.3.2.1	Demographics and Economic Profile _____	3-42
3.3.2.2	Education _____	3-44
3.3.2.3	Employment and Income _____	3-44
3.3.2.4	Health and Community Services _____	3-46
3.3.2.5	Municipal Services _____	3-46
3.3.3	Study Area Context _____	3-46
3.4	Eco-Tourism Activities _____	3-47
3.5	Civil Aviation _____	3-47
3.6	Defence _____	3-48

TABLES

Table 3-1:	Geological formations within the study area listed in order of relative age _____	3-12
Table 3-2:	Total population of the PKSDM, RLM, Northern Cape, and National for the period 2006 – 2016 (Sources: StatsSA 2016 ²⁸ and the Comparative Analysis for PKSDM, (Northern Cape Provincial Treasury, 2019) _____	3-41
Table 3-3:	Key statistics for the RLM for 2016, 2011, and 2001 (StatsSA, 2011 and 2016 ²⁸)	3-42



FIGURES

Figure 3-1:	Locality map for the proposed projects situated north-east of De Aar the Northern Cape	3-7
Figure 3-2:	Köppen-Geiger Climate Classification of South Africa, including the study area (Source: Köppen-Geiger Climate Classification)	3-8
Figure 3-3:	The average monthly distribution of rainfall within the De Aar area, including the study area (Source: World Weather Online, 2022)	3-9
Figure 3-4:	The average annual rainfall within the De Aar area, including the study area for the period 2010 – 2022 (Source: World Weather Online, 2022)	3-9
Figure 3-5:	The average monthly maximum and minimum temperature for the De Aar area, including the study area (Source: World Weather Online, 2022)	3-10
Figure 3-6:	The average and maximum annual wind speeds and gusts for the De Aar area, including the study area for the period 2010 – 2022 (Source: World Weather Online, 2022)	3-10
Figure 3-7:	Agricultural sensitivity of the study area and buildable areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-15
Figure 3-8:	pH measured at the Hydrocensus boreholes (Derived from: GEOSS, 2023).	3-17
Figure 3-9:	EC measured at the Hydrocensus boreholes (Derived from: GEOSS, 2022a).	3-17
Figure 3-10:	TDS measured at the Hydrocensus boreholes (Derived from: GEOSS, 2022a).	3-18
Figure 3-11:	Water Level measured at the Hydrocensus boreholes (Derived from: GEOSS, 2022a).	3-18
Figure 3-12:	A) HBH22 pipeline dam, picture taken in an east-south-easterly direction. B) HBH22 pipeline dam and water trough, picture taken in a south-south-westerly direction. Photos: ABO Wind.	3-19
Figure 3-13:	A) HBH22, picture taken in a south-south-easterly direction. B) HBH22 dam, picture taken in an easterly direction. Photos: ABO Wind.	3-20
Figure 3-14:	A) HBH20 pipeline dam and JoJo tank, picture taken in the easterly direction. B) HBH20 pipeline dam water trough, picture taken at the same location as Figure 3.16 (A) in the westerly direction. Photos: ABO Wind.	3-20
Figure 3-15:	A) HBH25 borehole and dam, picture taken in a southerly direction. B) HBH25 borehole and dam, picture taken in a south easterly direction. Photos: ABO Wind.	3-20
Figure 3-16:	Wind pump near Kudu Solar Facility 4. Picture taken in a south-easterly direction. Photo: L. Kellerman.	3-21
Figure 3-17:	Aquatic Biodiversity Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2022)	3-24

Figure 3-18:	Mapped Aquatic Biodiversity Sensitivities within the study area following the SSV and detailed mapping. Yellow indicates medium sensitivity (i.e. unnamed tributaries of the Orange River, larger watercourses and their floodplains, and wetlands) and green indicates low sensitivity (i.e. smaller feeder streams, drainage lines and their floodplains) (Source: Belcher, 2023)	3-25
Figure 3-19:	The study area and Buildable Areas in relation to Vegetation Types, Conservation Planning and Freshwater Ecosystem Priority Areas (FEPAs).	3-27
Figure 3-20:	Protected Areas in relation to the Study Area	3-29
Figure 3-21:	Terrestrial Plant Species sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-32
Figure 3-22:	Terrestrial Animal Species sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-33
Figure 3-23:	Terrestrial Biodiversity Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-33
Figure 3-24:	Potential Landscape (Solar) Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-36
Figure 3-25:	Archaeology and Cultural Heritage Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-38
Figure 3-26:	Palaeontology sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)	3-39
Figure 3-27:	Gender and age distributions within the RLM (Redrawn based on StatsSA, 2011 ³³).	3-43
Figure 3-28:	Population groups within the RLM (StatsSA, 2011 ³³).	3-43
Figure 3-29:	Employment status (ages 15 – 64) within the RLM (StatsSA, 2011 ³³).	3-44
Figure 3-30:	Average household income within the RLM (StatsSA, 2011 ³³).	3-45
Figure 3-31:	Percentage of households with access to basic services within the RLM (StatsSA, 2011 ³³).	3-46
Figure 3-32:	Civil Aviation sensitivity of the study area based on the Screening Tool. The Revised Scoping Buildable Areas are shown in grey (Source: Screening Tool, 2022)	3-48
Figure 3-33:	Defence sensitivity of the study area and Buildable Area based on the Screening Tool (Source: DFFE Screening Tool, 2023)	3-49

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter of the Environmental Impact Assessment (EIA) Report provides a broad overview of the affected environment for the proposed Kudu Solar Facility 1 and associated infrastructure (hereafter referred to as the “Kudu Solar Facility” or “proposed project”) and the surrounding area.

The receiving environment is understood to include biophysical, socio-economic, and heritage aspects, which could be affected by the proposed project or which in turn might impact on the proposed project.

This information is provided to inform the identification of the potential issues and impacts of the proposed project on the environment and vice versa. The information presented within this chapter has been sourced from *inter alia*:

- Inputs from the specialists that form part of the project team;
- Feedback from the National Department of Forestry, Fisheries and the Environment (DFFE) National Web-based Environmental Screening Tool (hereafter referred to as the Screening Tool), where applicable;
- Review of *inter alia* information sources available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS), Agricultural Geo-Referenced Information System (AGIS), Endangered Wildlife Trust (EWT) Threatened Species No-Go Map;
- Northern Cape Province Provincial Growth and Development Strategy;
- Northern Cape Provincial Spatial Development Framework (SDF);
- Pixley ka Seme District Municipality (PKSDM) Integrated Development Plan (IDP);
- PKSDM SDF;
- Renosterberg Local Municipality (RLM) IDP; and
- Emthanjeni Local Municipality IDP.

It is important to note that this chapter intends to provide a broad overview of the affected environment and does not represent a detailed environmental study. Detailed descriptions of the study area, buildable area, and development footprint are provided in the relevant specialist assessments, which are included in Chapter 6 to 19 of this EIA Report.

3.1 Background, Study Area, and Buildable Areas

As indicated in Chapter 1 of this EIA Report, the proposed project forms part of a cluster of 12 Solar Photovoltaic (PV) facilities and associated infrastructure located approximately 50 km north-east of De Aar in the Northern Cape Province. The study area for all proposed Kudu Solar Facilities 1 to 12 is the full extent of the eight affected farm portions (approximately 8 150 hectares (ha)). Refer to Chapter 1 of this EIA Report for a list of the affected farm properties with associated SG codes, as well as Chapter 2 for feedback on the applicable properties per project.

Refer to Chapter 2 of this EIA Report for additional information on how the study area (8 150 hectares, consisting of eight affected farm properties) evolved into the buildable areas and preferred development footprint.

As previously noted, the proposed project is located within the Renosterberg Local Municipality, which falls within the Pixley ka Seme District Municipality (PKSDM). Figure 3-1 below provides a locality map of the study area and the Kudu Solar Facilities.

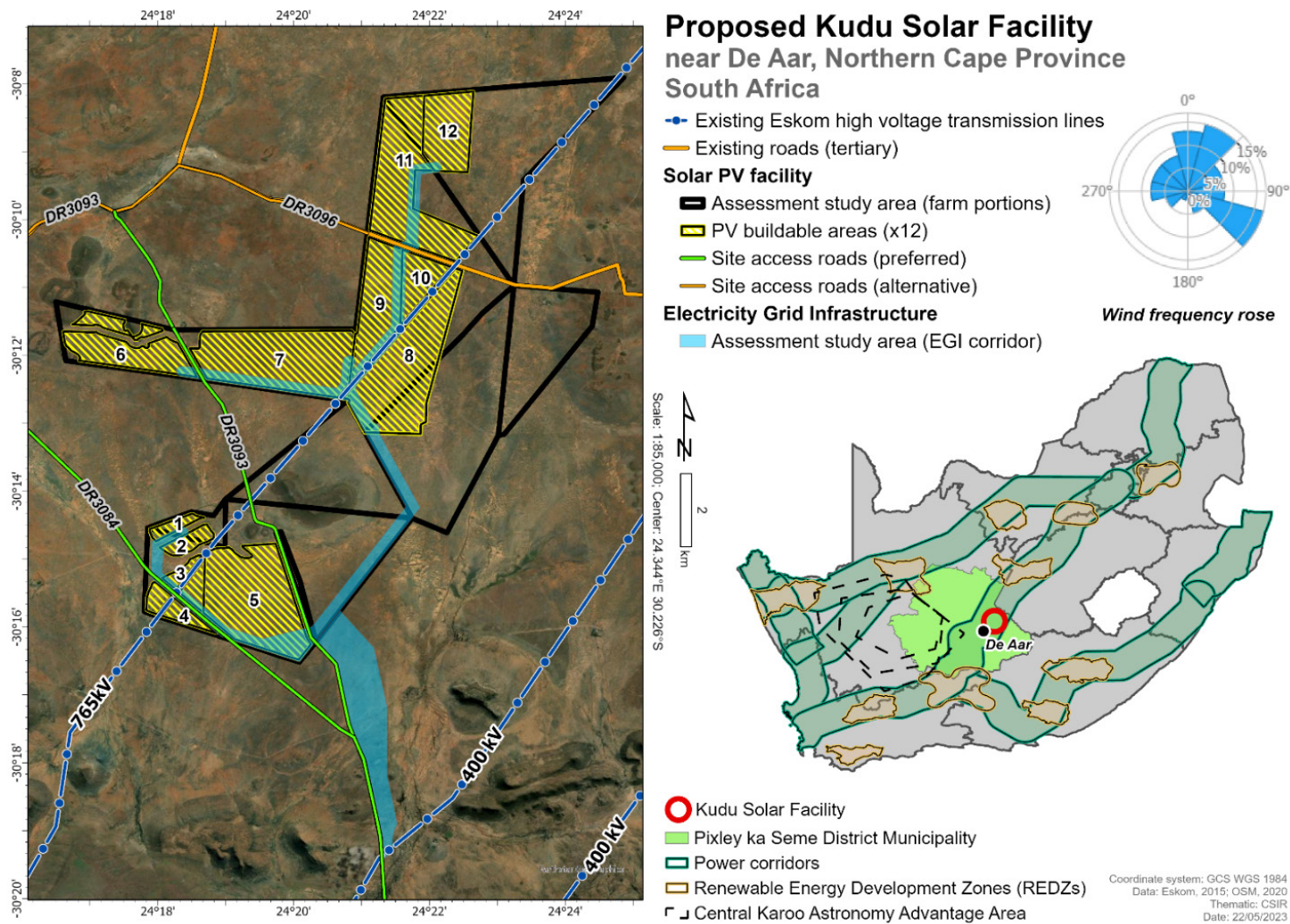


Figure 3-1: Locality map for the proposed projects situated north-east of De Aar the Northern Cape

3.2 Biophysical Environment

3.2.1 Climate and Climate Change

3.2.1.1 General Context

The study area lies near the eastern edge of the Nama Karoo Biome, which is situated on the central plateau of the western half of South Africa extending into south-eastern Namibia, and the Grassland Biome. The study area is located in three vegetation types, namely the Northern Upper Karoo (NKu3), the Eastern Upper Karoo (NKu4) and the Besemkaree Koppies Shrubland (Gh4) (Mucina and Rutherford, 2006, updated¹).

More specifically, according to the Köppen-Geiger climate classification method the majority of the study area is classified “BSk”, which is indicative of a cold semi-arid climate (Figure 3-2). The region is characterised with a mean annual rainfall of 287 mm and average temperatures varying from 5°C in July to 31°C in January. The highest average temperatures occur from December to February (Figure 3-5).

Figure 3-3 shows the average monthly distribution of rainfall within the De Aar area, including the proposed project study area, with most of the rainfall occurring during December to March. Figure 3.4 shows the average annual rainfall within the region for the period 2010 to 2022. Figure 3-5 shows the average monthly maximum and minimum temperature within the region. The area is characteristic of gusty winds prevailing for most of the year, with the average gust falling within the 15 to 30 kmph range (Figure 3-6).

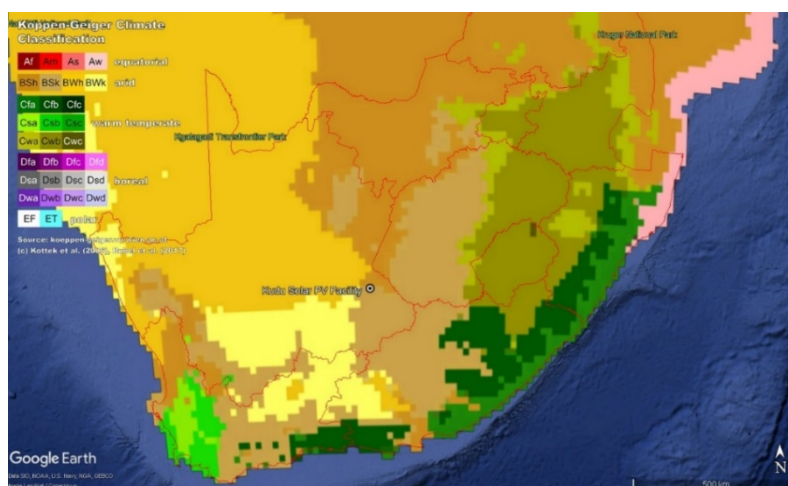


Figure 3-2: Köppen-Geiger Climate Classification of South Africa, including the study area (Source: Köppen-Geiger Climate Classification²)

¹ Mucina, L. and Rutherford, M.C. (Eds.) 2010. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria.

² Kottek, M., J. Grieser, C. Beck, B. Rudolf, and F. Rubel, 2006: World Map of the Köppen-Geiger climate classification updated. Meteorol. Z., 15, 259-263. DOI: 10.1127/0941-2948/2006/0130. Available at: <http://koeppen-geiger.vu-wien.ac.at/present.htm> [online]. Accessed: November 2022.

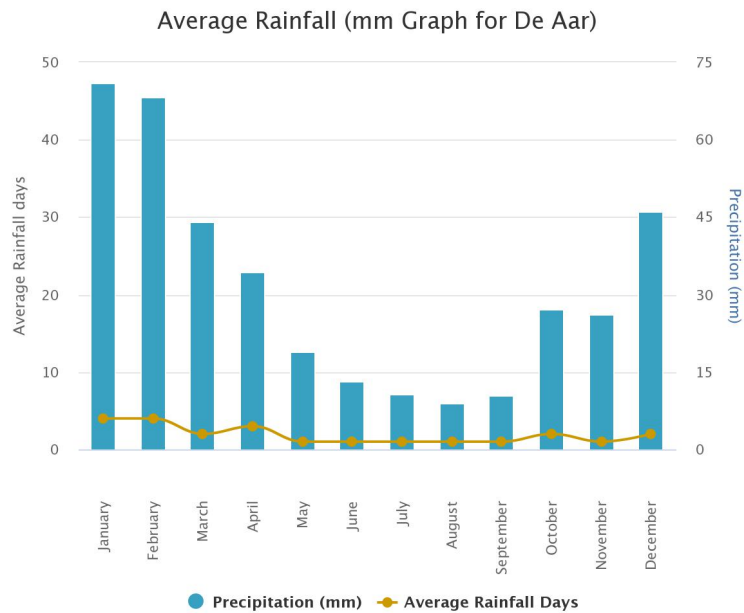


Figure 3-3: The average monthly distribution of rainfall within the De Aar area, including the study area (Source: World Weather Online, 2022³)

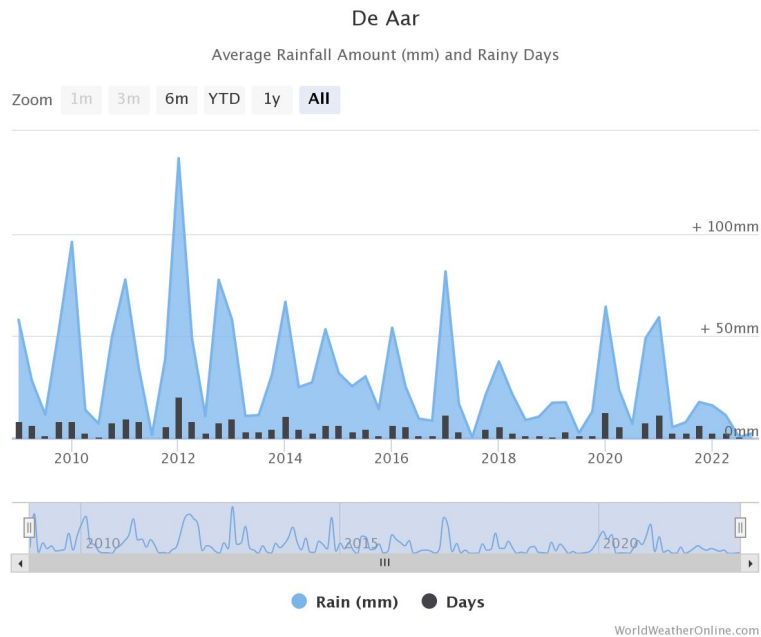


Figure 3-4: The average annual rainfall within the De Aar area, including the study area for the period 2010 – 2022 (Source: World Weather Online, 2022⁴)

³ World Weather Online. 2022. De Aar Annual Weather Averages. Available at: <https://www.worldweatheronline.com/de-aar-weather-averages/north-western-province/za.aspx> [online]. Accessed: 25 November 2022.

⁴ World Weather Online. 2022. De Aar Annual Weather Averages. Available at: <https://www.worldweatheronline.com/de-aar-weather-averages/north-western-province/za.aspx> [online]. Accessed: 25 November 2022.

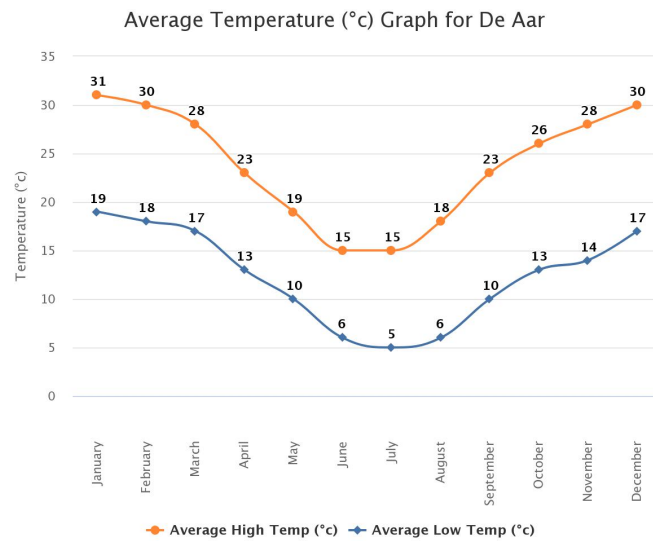


Figure 3-5: The average monthly maximum and minimum temperature for the De Aar area, including the study area (Source: World Weather Online, 2022⁵)

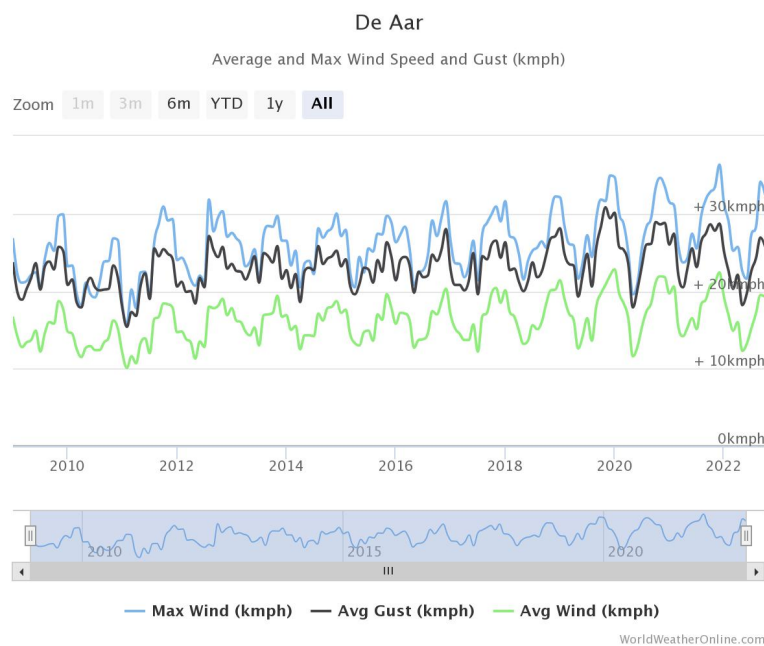


Figure 3-6: The average and maximum annual wind speeds and gusts for the De Aar area, including the study area for the period 2010 – 2022 (Source: World Weather Online, 2022⁶)

⁵ World Weather Online. 2022. De Aar Annual Weather Averages. Available at: <https://www.worldweatheronline.com/de-aar-weather-averages/north-western-province/za.aspx> [online]. Accessed: 25 November 2022.

⁶ World Weather Online. 2022. De Aar Annual Weather Averages. Available at: <https://www.worldweatheronline.com/de-aar-weather-averages/north-western-province/za.aspx> [online]. Accessed: 25 November 2022.

3.2.1.2 Climate Change

Projected climate change data indicates that by 2025 the Northern Cape Province will be affected by higher annual average temperatures⁷. Regional predictions suggest a drying trend from west to east, a shift to more irregular rainfall of possibly greater intensity, and rising temperatures everywhere (Pixley ka Seme District, 2014)⁸.

The higher temperatures will be associated with an increase in evaporation rates and an increase in the intensity of droughts. This will likely cause agricultural outputs to reduce, thereby adversely affecting food security. The drought periods coupled with increased evaporation and temperatures, will negatively impact the water supply, which is currently restricted. Furthermore, the increase in temperatures anticipated with climate change may result in increased fire frequencies. Invasive alien plants are often highly flammable and with their large volumes, are likely to fuel more frequent fires. The combination of more frequent and intense fires will have a devastating impact on the region. Consequently, climate change is one of the biggest risks facing the Northern Cape Province (Pixley ka Seme District, 2014⁸).

The Green Book provides detailed projections for future climate change in South Africa. The information captured below has been summarised from the Green Book (Engelbrecht et al., 2019⁹). The projections used in the Green Book are for the following two climate change mitigation scenarios: Representative Concentration Pathways (RCP) 8.5 – where low mitigation is implemented; and RCP 4.5 – where high mitigation is implemented.

- **Fire Likelihood** - The likelihood of wildfires occurring in the interface between developed land and fire-prone vegetation in the region of the RLM is regarded as low in terms of current hydro-meteorological trends. In terms of the projected number of fire danger days under an RCP 8.5 low mitigation (worst case) scenario, the study area varies from about 30 to 60. De Aar and Petrusville are at medium risk of increases in wildfires by the year 2050.
- **Flood Hazard** – The region of the RLM mainly includes a medium flooding hazard currently. There is largely a slight increase and moderate increase in extreme rainfall days projected for the year 2050. De Aar is at a low risk of increase in urban flooding under an RCP 8.5 low mitigation (worst case) scenario, whereas some areas within the study area and close to Petrusville area at a high and extreme risk (projected change for 2050).
- **Drought** – In terms of the projected change in drought tendencies for the period of 1995 to 2024, there is an increase in drought tendencies per 10 years within the region (ranging from 0 to -0.2) (more frequent than the observed baseline). De Aar and Petrusville are at medium and low risk of increases in drought tendencies, respectively, by the year 2050.

⁷ <https://letsrespondtoolkit.org/municipalities/northern-cape/>

⁸ Pixley Ka Seme District (2014). Pixley Ka Seme District Spatial Development Framework / Land Development Plan (SDF), 2013-2018. <https://www.pksdm.gov.za/sdfs/PixleySDFMayFinal.pdf> [online], Accessed November 2022.

⁹ Engelbrecht, F., Le Roux, A., Arnold, K. & Malherbe, J. 2019. *Green Book. Detailed projections of future climate change over South Africa*. Pretoria: CSIR. Available at: <https://pta-gis-2-web1.csir.co.za/portal/apps/GBCascade/index.html?appid=b161b2f892194ed5938374fe2192e537>. Accessed November 2022.

3.2.2 Topography and Landscape

The information described below is based on inputs provided by the Visual, Palaeontology and Socio-economic Specialists, which are included in Chapters 10, 12, and 13, respectively, of this EIA Report.

The study area lies within an expansive flattish landscape, composed of Ecca Group shales, interspersed with dolerite-capped koppies (e.g., Swartkoppies / Tierberg / Perdekop) and includes the small isolated *koppie* Basberg (1466 m amsl). These main scenic features in the area provide topographic relief in the expansive flattish landscape. The elevation ranges from 1000 to 1500 m in the region. The topography of Pixley Ka Seme region is one of its main assets with vast open spaces and unspoilt panoramic visual vistas stretching over great distances (Pixley ka Seme District, 2014⁸).


3.2.3 Geology

A detailed description of the geology of the study area is provided by the Terrestrial Biodiversity, Palaeontology, Geohydrology and Geotechnical Specialists, which are included in Chapters 7, 12, 16, and 17 of this EIA Report, respectively.

The main geology of the study area is listed in Table 3-1. The main geological units mapped within the wider study region include:

- Tierberg Formation (Ecca Group, Karoo Supergroup) – Pt Note that the upper part of this succession is now referred to the Waterford Formation.
- Adelaide Subgroup – Pa. Note that this is outside the study area.
- Karoo Dolerite Suite – Jd.
- Quaternary calcrete hardpans – Qc.
- Late Caenozoic alluvium
- Unmapped Late Caenozoic superficial sediments include colluvium, eluvial surface gravels and soils (including possible relict aeolian sands of the Gordonia Formation, Kalahari Group).

Table 3-1: Geological formations within the study area listed in order of relative age

Symbol	Formation	Group	Lithology
	Quaternary Deposit		Alluvium / Terrace Gravel
Qc			Calcrete
Jd	Jurassic Intrusion		Dolerite
Pa	Adelaide Formation	Beaufort Group	Blue-grey silty mudstone, subordinate brownish-red mudstone; sandstone
Pt	Tierberg Formation	Ecca Group	Blue-grey to black shale with carbonate-rich concretions; subordinate siltstone and sandstone in upper part

The majority of the study area is underlain at depth by non-marine basinal mudrocks of the Tierberg Formation (Ecca Group, Karoo Supergroup) of Early to Middle Permian age (designated on hillslopes on the farm Swart Koppies 86, just south of the study area) The Tierberg Formation is a recessive-weathering, mudrock-dominated succession consisting predominantly of dark, well-laminated, carbonaceous shales with subordinate thin, fine-grained sandstones. These Ecca sedimentary bedrocks are currently only mapped at surface on the slopes of Basberg, as well as the koppies just east of Wolwekuil farmstead on Farm 42/RE where they crop out intermittently as low cliffs of metasediments which have been thermally metamorphosed by dolerite intrusion. Well-developed sills and dykes of the Early Jurassic Karoo Dolerite Suite build and / or cap all the koppies within and on the margins of the study area (including Basberg) and also underlie some lower-lying areas.

Soils are variable from shallow to deep, red-yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms.

3.2.4 Agriculture and Land Capability

The information described below is based on the Agriculture Compliance Statement included in Chapter 6 of this EIA Report.

3.2.4.1 General Context

Agricultural sensitivity, as used in the Screening Tool, is a direct function of the capability of the land for agricultural production. The general assessment of agricultural sensitivity that is employed in the Screening Tool, identifies all arable land that can support viable crop production, 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 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.

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 classes (≥ 8 to 15) are likely to be suitable as arable land for the production of cultivated crops, while the lower classes are only likely to be suitable as non-arable grazing land.

3.2.4.2 Screening Tool Descriptions and Site Sensitivity Verification

A map of the study area and Buildable Areas in relation to the Agricultural Sensitivity provided by the Screening Tool is shown in Figure 3-7. Since none of the land within the study area is classified as cropland, the agricultural sensitivity is therefore purely a function of land capability. The land capability of the study area, as depicted by the Screening Tool, is predominantly 5 and 6, but varies from 3 to 7. The small-scale differences in the modelled land capability across the study 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 3 to 5 translate to a low agricultural sensitivity and values of 6 to 7 translate to a medium agricultural sensitivity, although there is little real difference between low and medium agricultural sensitivity on the ground. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.

The agricultural sensitivity, as identified by the Screening Tool, is confirmed by the Agriculture Compliance Statement (Chapter 6 of the EIA Report). The motivation for confirming the sensitivity is predominantly that the climate data (low rainfall of approximately 280 to 305 mm per annum and high evaporation of approximately 1 470 to 1 540 mm per annum) proves the area to be arid, and therefore of limited land capability. The land capability value is in keeping with the climate limitations that make the site totally unsuitable for dryland crop production.

The Site Sensitivity Verification (SSV) verified that the entire study area is of less than high agricultural sensitivity with a land capability value of 5 to 6. The required level of agricultural assessment is therefore confirmed as an Agricultural Compliance Statement. Based on the above and various factors, the impact of the proposed project on the agricultural production capability of the site is assessed as being acceptable. Therefore, from an agricultural impact point of view, it has been recommended that the proposed project be approved.

Therefore, there are no areas that specifically need to be avoided by the proposed project from an agricultural perspective. Furthermore, the Agriculture specialist has confirmed that the exact nature and layout of the different infrastructure within the proposed Kudu Solar Facility has no bearing on the significance of agricultural impacts because it is the total footprint size (and its agricultural production potential) that determines the impact significance. Any alternative layout within the footprint is considered acceptable. Furthermore, in this agricultural environment with uniformly low production potential, the location of the proposed project within the properties will also make absolutely no material difference to the significance of the agricultural impacts.

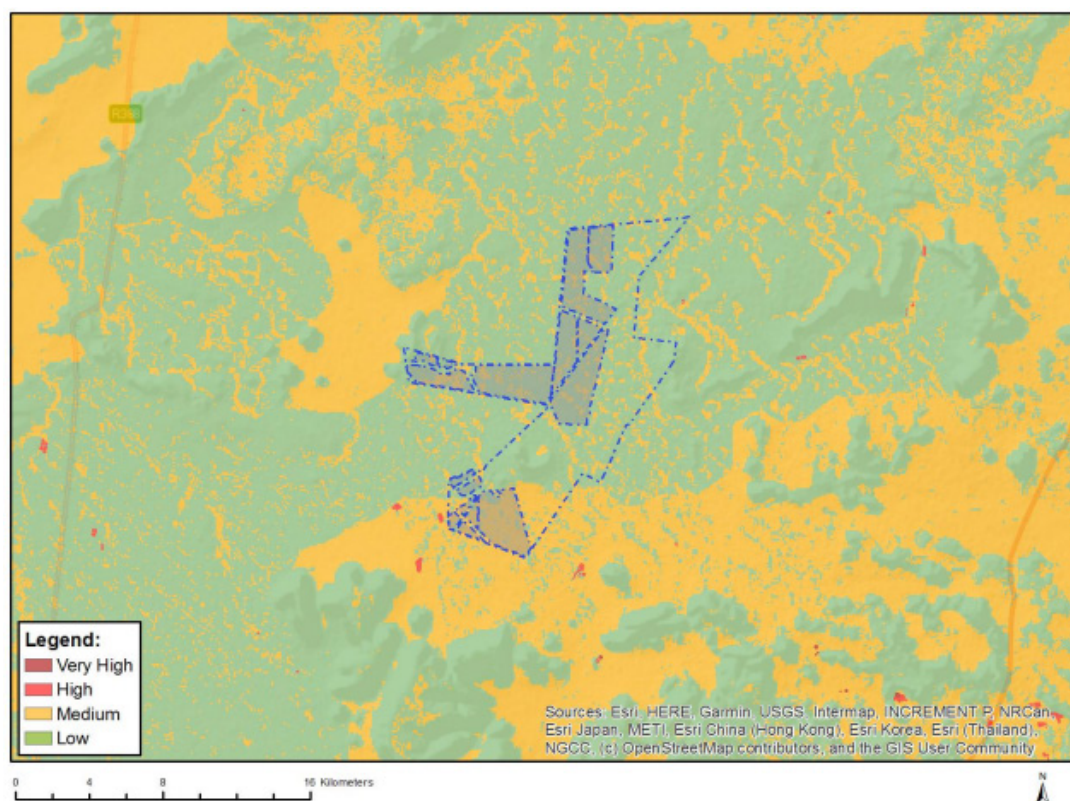


Figure 3-7: Agricultural sensitivity of the study area and buildable areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)

3.2.5 Geohydrology

The information described below is based on inputs provided by the Geohydrology Specialist, which are included in Chapter 16 of this EIA Report.

3.2.5.1 Regional and Site-Specific Information

- **Regional Hydrogeology:**

The regional aquifer directly underlying the study area is classified by the Department of Water Affairs and Forestry (DWAFF) as a fractured aquifer with an average yield potential of less than 2 litres a second. A fractured aquifer describes an aquifer where groundwater only occurs in narrow fractures within the bedrock. However, based on the geological map and the site-specific information it is known that the Quaternary Deposits of alluvium and calcrete form an intergranular aquifer on top of the fractured bedrock. An intergranular aquifer is a primary aquifer and is described as an aquifer in which groundwater is stored within the flows through open pore spaces in the unconsolidated Quaternary deposits.

Based on the DWAF (2005) mapping of the regional groundwater quality, the groundwater underlying the study area and the surrounding area is in the range of 70 – 300 milli-Siemens per metre (mS/m). This is considered to be “good to marginal” quality for water with respect to drinking water standards.

- **Aquifer Vulnerability**

The proposed project study area has a Low to Medium groundwater vulnerability. The intergranular aquifer is considered to be of medium groundwater vulnerability, as it lies on top of the fractured aquifer and has no means of protection. Therefore, any contamination that is introduced on the surface of the intergranular aquifer will infiltrate into the subsurface and can cause contamination of the intergranular aquifer.

- **Site Specific and Existing Groundwater Information**

- **National Groundwater Archive (NGA) Database**

The NGA database provides data on borehole positions, groundwater chemistry and yield, where available. The NGA indicated there is one borehole surrounding the study area. The borehole has a yield of 0.18 L/s, depth of 73.46 m and a lithology of shale followed by sandstone.

- **Hydrocensus**

A representative hydrocensus was conducted by the Geohydrology Specialist in March 2022 on the farm portions that form the study area, and the surrounding farm portions. During the hydrocensus, borehole depth, water level (WL), pH, total dissolved solids (TDS) and electrical conductivity (EC) were measured. A total of 51 boreholes were identified, however, some of them could not be accessed due to poor weather conditions on site; and data could not be obtained from some of them due to a base plate that covered the whole borehole, or the information was unavailable.

From the information obtained during the hydrocensus it is clear that the boreholes are shallow in the area as all of them were wind pumps, and all of the boreholes were only drilled into the alluvium (as confirmed by the farmers). The water is mainly used for domestic use and livestock watering. The boreholes had a pH that ranged from 6.8 to 9.6 (Figure 3-8), an EC that ranged from 57 mS/m to 126 mS/m (Figure 3-9), a TDS that ranged from 270 mg/L to 1260 mg/L (Figure 3-10), and a WL that ranged from 6.4 metres below ground level (mgb/l) to 17.75 mgb/l (Figure 3-11).

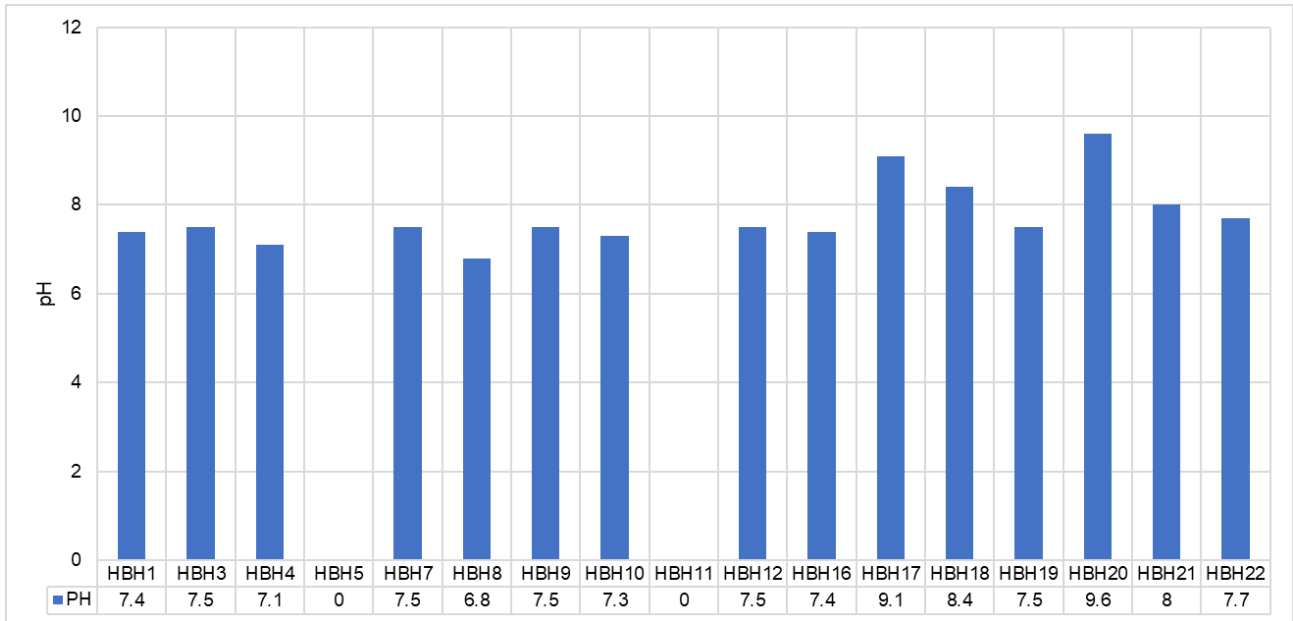


Figure 3-8: pH measured at the Hydrocensus boreholes (Derived from: GEOSS, 2023¹⁰).

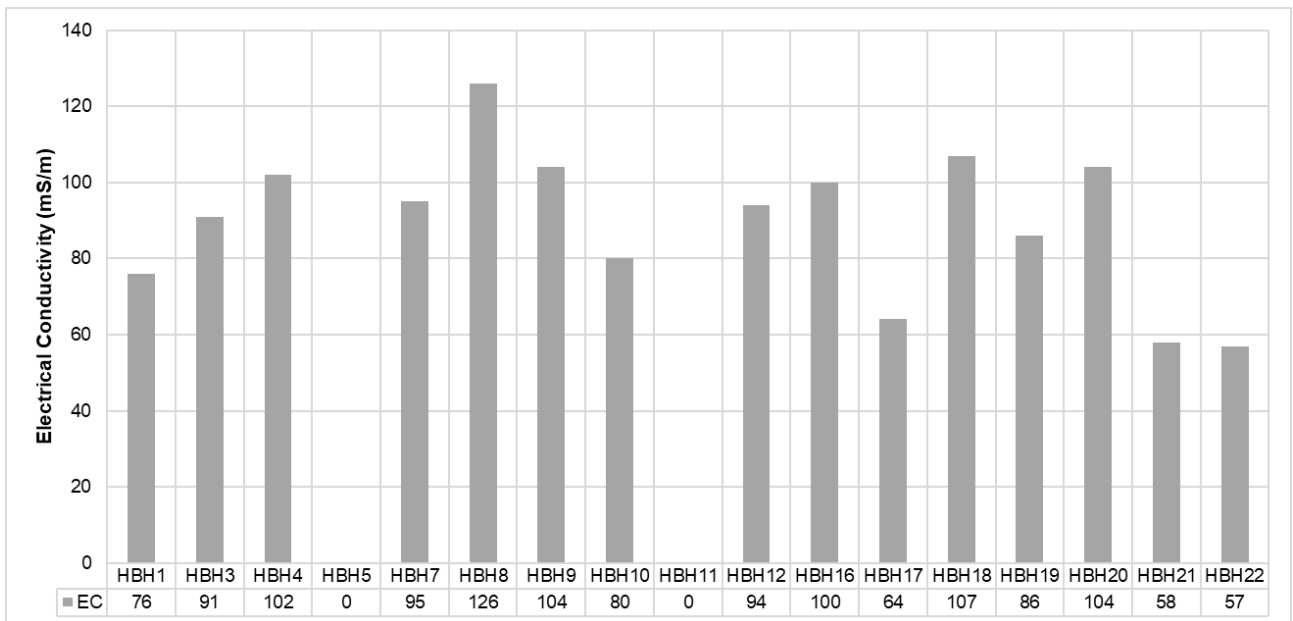


Figure 3-9: EC measured at the Hydrocensus boreholes (Derived from: GEOSS, 2022a).

¹⁰ GEOSS (2023). Geohydrology Assessment for the proposed Kudu Solar Facilities and associated infrastructure, i.e., Chapter 16 of this EIA Report. Prepared for the Scoping and EIA for the Kudu Solar Facilities and associated infrastructure.

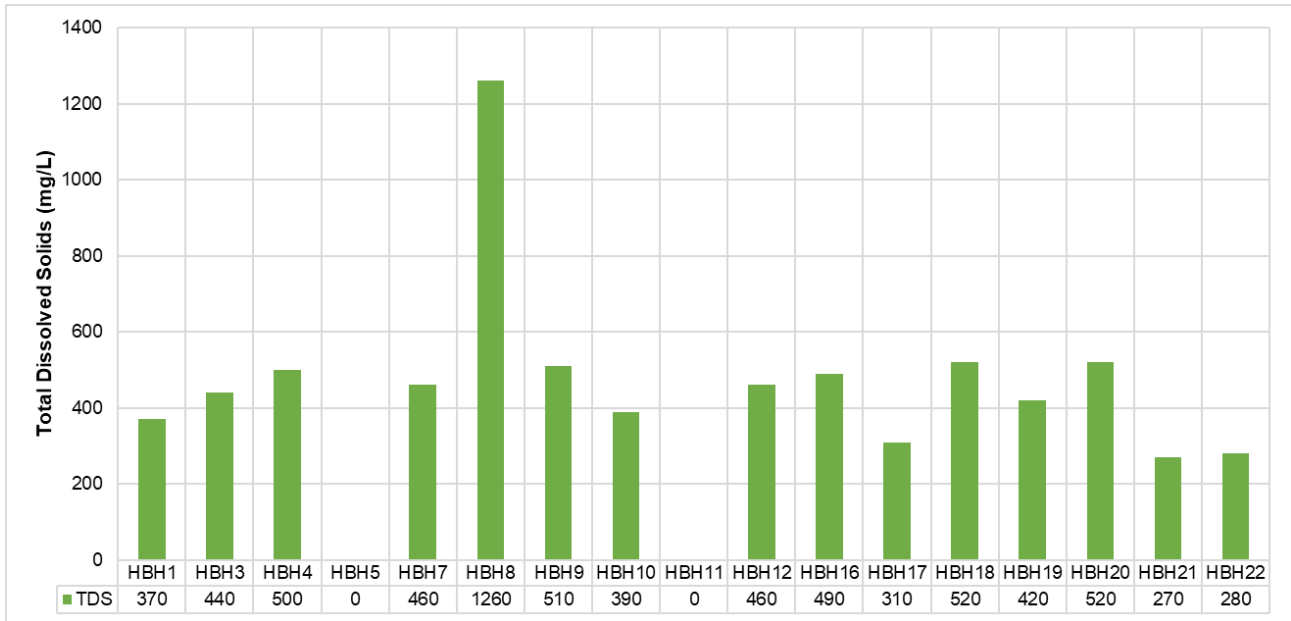


Figure 3-10: TDS measured at the Hydrocensus boreholes (Derived from: GEOSS, 2022a).

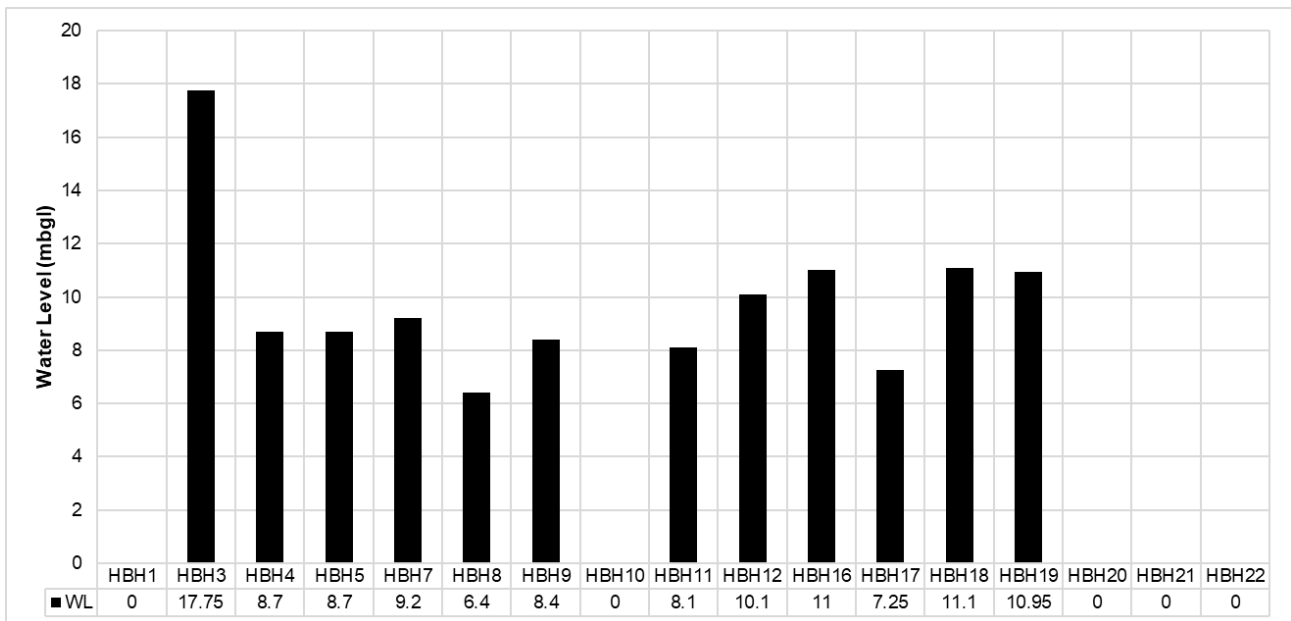


Figure 3-11: Water Level measured at the Hydrocensus boreholes (Derived from: GEOSS, 2022a).

The groundwater quality data obtained during the hydrocensus was assessed by the specialist to establish if the groundwater is suitable for the following uses: potable water; domestic use which will include housekeeping and ablutions; washing of panels; and general construction and concrete batching.

Refer to Chapter 4 of this EIA Report, as well as Chapter 16 for the legal implications of usage of the existing boreholes, as well as the findings of the hydrocensus and analysis in terms of the relevant drinking water standards.

Based on discussions with the landowners, the following water points might be closed or removed collectively for the entire development:

- **HBH 22 pipeline dam located on Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41:** This consists of a dam and water trough, and it is only fed via a pipeline from Borehole HBH 22 that is located to the south-south-east. Refer to Figure 3-12 for additional information.
- **HBH 22 dam located on Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41:** This consists of a dam that is only fed via a pipeline from a borehole to the north-east. Refer to Figure 3-13 for additional information.
- **HBH 20 pipeline dam located on Portion 2 of Farm Grass Pan 40:** This consists of a JoJo tank, pipeline dam and water trough. Refer to Figure 3-14 for additional information.
- **HBH 25 located on Remaining Extent of Portion 3 of the Farm Bas Berg No. 88:** This consists of a borehole and dam. Refer to Figure 3-15 for additional information.
- **Water point located on Remaining Extent of Portion 3 of the Farm Bas Berg No. 88:** This consists of a wind pump. Refer to Figure 3-16 for additional information.



Figure 3-12: A) HBH22 pipeline dam, picture taken in an east-south-easterly direction. B) HBH22 pipeline dam and water trough, picture taken in a south-south-westerly direction. Photos: ABO Wind.



Figure 3-13: A) HBH22, picture taken in a south-south-easterly direction. B) HBH22 dam, picture taken in an easterly direction. Photos: ABO Wind.



Figure 3-14: A) HBH20 pipeline dam and JoJo tank, picture taken in the easterly direction. B) HBH20 pipeline dam water trough, picture taken at the same location as Figure 3.16 (A) in the westerly direction. Photos: ABO Wind.



Figure 3-15: A) HBH25 borehole and dam, picture taken in a southerly direction. B) HBH25 borehole and dam, picture taken in a south easterly direction. Photos: ABO Wind.



Figure 3-16: Wind pump near Kudu Solar Facility 4. Picture taken in a south-easterly direction. Photo: L. Kellerman.

The relevant specialists have noted that closure or removal of the water points listed above are not a concern. After removal or closure, the pipelines would be left on site and the PV panels would be installed over them. In the event of future relocation, this will be dealt with as a separate process in line with the relevant regulations and legislative requirements at the time.

3.2.5.2 Screening Tool Descriptions and Site Sensitivity Verification

There are no dedicated Geohydrology or Groundwater themes on the Screening Tool as of November 2022 and May 2023, therefore the environmental sensitivity of the proposed project area as identified by the Screening Tool is not applicable. Furthermore, there is no dedicated assessment protocol prescribed for Geohydrology or Groundwater. Therefore, the specialist assessment has been undertaken in compliance with Appendix 6 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended), as stipulated in Part A of the Assessment Protocols published in Government Notice (GN) 320 in March 2022.

3.2.6 Strategic Water Source Areas

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; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b)” (Le Maitre *et al.*, 2018:1 in Department of Environment, Forestry and Fisheries (DEFF) [now operating as the DFFE], 2019: Page 60¹¹).

¹¹ Department of Environment, Forestry and Fisheries (DEFF), 2019. Strategic Environmental Assessment for the Development of a Phased Gas Pipeline Network in South Africa. CSIR Report Number: CSIR/SPLA/EMS/ER/2019/0077/B. ISBN Number: ISBN 978-0-7988-5649-2. Stellenbosch and Durban.

Thirty-seven groundwater SWSAs have been identified in South Africa and are considered to be strategically important at a national level for water and economic security. The total area for groundwater SWSAs extends approximately 104 000 km² and covers approximately 9% of the land surface of South Africa (Le Maitre *et al.*, 2018, in DEFF, 2019: Page 61). They also include transboundary Water Source Areas that extend into Lesotho and Swaziland.

The proposed project study area is located about 28 km to the north-east of the De Aar Region Groundwater SWSA, however the proposed project will not impact this area.

3.2.7 Aquatic Biodiversity

Various resources, such as, but not limited to, Google Earth satellite imagery, the Northern Cape Biodiversity Sector Plan (NCBSP), and the National Fresh Water Priority Areas (NFEPA), have been used to define the regional vegetation, water resources, fauna and anticipated ecological sensitivity of the study area. A literature review of existing reports, scientific studies, databases, reference works, guidelines, and legislation relevant to the study area was conducted to establish the baseline ecological and vegetative condition of the site and associated environment. Details pertaining to the aquatic environment is provided in the Aquatic Biodiversity and Species Impact Assessment that is included in Chapter 8 of this EIA Report.

3.2.7.1 General Context

The majority of the study area is located in the Upper Orange Water Management Area (WMA), whilst less than 10% thereof falls within the Lower Orange WMA. The Catchment Area is comprised of unnamed ephemeral tributaries of the middle reach of the Orange River and the study area is located within the D33B (Upper Orange) and D62F (Lower Orange) Quaternary Drainage Regions (QDRs). The majority of the landscape consists of flat to slightly undulating plains with shallow valleys and small hilltops that are drained by non-perennial (ephemeral), northward-flowing tributaries of the Orange River. General drainage within the study area is from south to north. The elevation of the study area ranges from approximately 1250 to 1350 m.a.s.l.

The aquatic features within the study area comprise ephemeral unnamed tributaries of the Orange River. The larger watercourses flow along the eastern and western extents of the study area, flowing in a northerly direction to join the Orange River downstream of Van der Kloof Dam. Associated with these larger watercourses are wide floodplains. The larger watercourse channels tend to be shallow and wide. Smaller watercourses and drainage features drain into the larger river corridors.

The rivers can all be characterised as foothill and lowland rivers within the Nama Karoo Ecoregion. A dominant feature of the larger rivers is the alluvial floodplains that are characterised by multiple channels that are interchangeably used during higher flow events. These sandy floodplains tend to have mostly bare beds, with vegetation occurring in clumps along the bed and more densely along the banks. The ephemeral watercourses are highly dependent on groundwater discharge. The substrate comprises a mix of gravel and alluvium. Wetland areas tend to comprise depressions on the valley floor that occur as a perched feature on calcrete layers.

Due to the climatic conditions of the area, the watercourses and the wetland areas that occur in the area are ephemeral (non-perennial), only containing water for short periods, immediately following local rainfall events.

The vegetation for the larger watercourses usually comprises indigenous grasses (*Eragrostis* and *Stipagrostis* species and *Themeda triandra*) with a distinct riparian vegetation comprising larger shrubs such as *Searsia pyroides* and *Melianthus comosus*. These smaller ephemeral streams and drainage features within the study area do not have a distinct channel or vegetation. Wetland areas contain *Phragmites australis* in the larger features, while the smaller features contain some wetland indicator species such as *Schoenoplectus* spp.

The ephemeral streams and floodplains provide aquatic habitat to a diverse array of faunal species that are adapted to the brief periods of inundation to carry out much of their life phases. Amphibians such as the Poynton's River Frog (*Amietia poyntoni*), Tandy's sand frog (*Tomopterna tandyi*), African bullfrog, (*Pyxicephalus adspersus*), Pygmy Toad (*Poyntonophrynus vertebralis*) and Karoo Toad, *Vandijkophrynus gariiepensis* use the inundated pools for breeding. Other biota that use the temporary wet habitats comprise migratory birds and many invertebrates such as water fleas (*Daphnia* spp.) and tadpole shrimps (*Triops* spp.). Connectivity between aquatic ecosystems and the surrounding terrestrial landscape is essential for supporting the fauna of these ecosystems.

The watercourses and associated wetlands and floodplains are in a largely natural to moderate condition due to the low level of impact in the area. It is recommended that the larger watercourses, floodplains and wetlands within the site are not allowed to degrade further from their current ecological condition of largely natural to moderately modified.

Impacts to the watercourses in the study area are associated with agricultural encroachment, livestock grazing and infrastructure (road and powerline) construction and maintenance. The ephemeral aquatic ecosystems are particularly vulnerable to changes in hydrology as they are specifically adapted to the sporadic flow conditions that naturally occur. Contaminants and sediment are not regularly flushed from these streams.

The catchments of the tributaries of the Orange River within the study area do not fall within any National Freshwater Ecosystem Priority Area (FEPA) river sub-catchments. FEPAs are priority areas for conserving freshwater ecosystems and supporting sustainable use of water resources and upstream management areas. FEPAs were identified based on the representation of ecosystem types and flagship free-flowing rivers, maintenance of water supply areas in areas with high yields of water, identification of connected ecosystems and preferential identification of FEPAs that overlapped with any free-flowing river and priority estuaries identified in the 2011 National Biodiversity Assessment.

The only FEPA Wetland within the study area is a largely artificial wetland associated with a farm dam or erosion control structure and is thus not considered of high aquatic biodiversity conservation significance. There is also a natural depression wetland that is within the valley floor of the river system to the west of the study area that is mapped as a FEPA Wetland. Both wetlands are located outside of the study area and are unlikely to be impacted by the proposed project. The artificial wetland is more than 100 m from the study area, while the natural wetland is more than 3 km away.

3.2.7.2 Screening Tool Descriptions and Site Sensitivity Verification

Figure 3-17 below presents the information from the Screening Tool for the Aquatic Biodiversity Combined Sensitivity as it relates to the study area and the Revised Scoping Buildable Areas. Evident from this data is that the area under consideration is generally considered to be of low Aquatic Biodiversity Combined Sensitivity. The very high sensitivity mapped within the study area is linked to the mapped wetlands in the National Wetland Map Version 5 (NWM5) (the wider river floodplains associated with the unnamed tributaries of the Orange River located in the eastern and western portions of the wider study area).

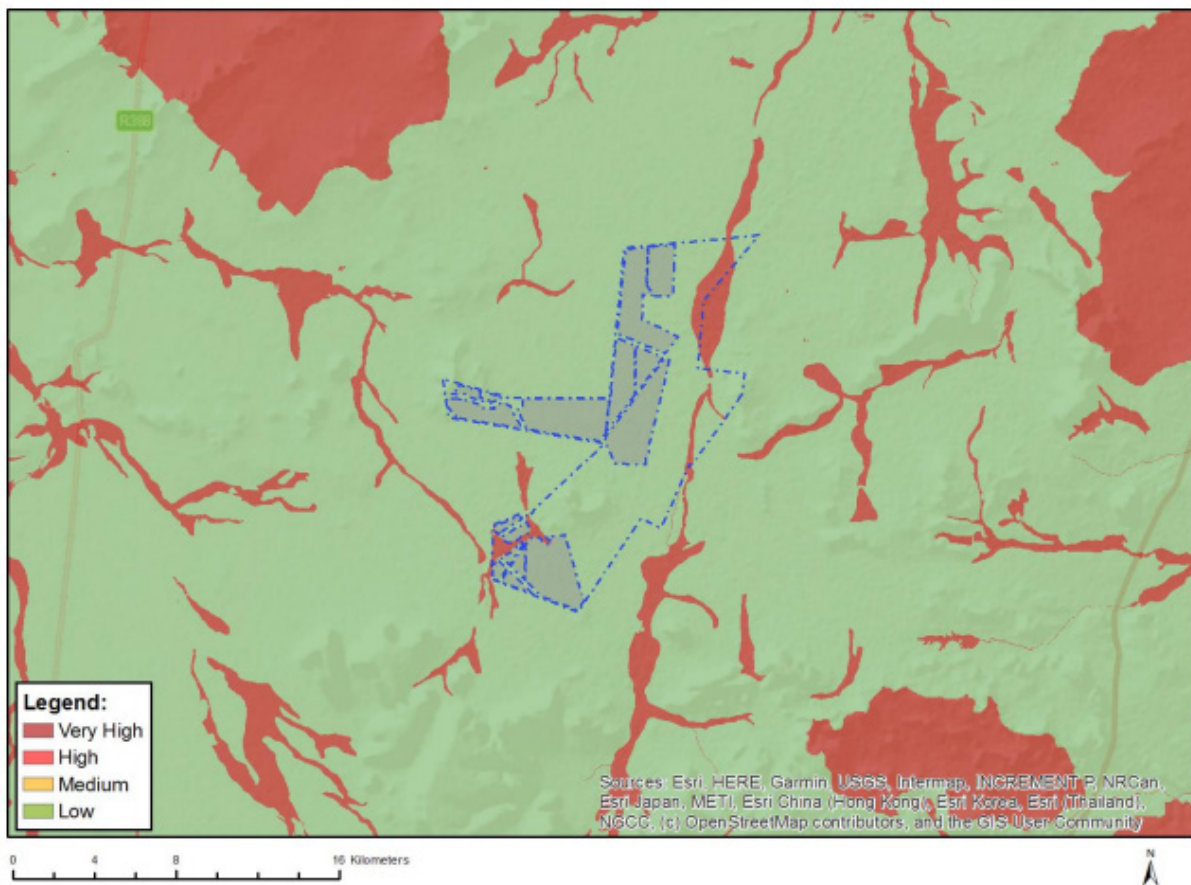


Figure 3-17: Aquatic Biodiversity Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2022)

However, following the SSV, the aquatic constraints of the wider study area have been mapped in detail and their aquatic ecosystem sensitivities are shown below in Figure 3-18. The larger watercourses and associated floodplains, as well as wetland areas within the study area, are deemed to be of **medium aquatic ecological sensitivity**. The smaller watercourses and drainage lines that should not pose an aquatic ecosystem constraint to the proposed project are considered to be of **low aquatic ecological sensitivity**.

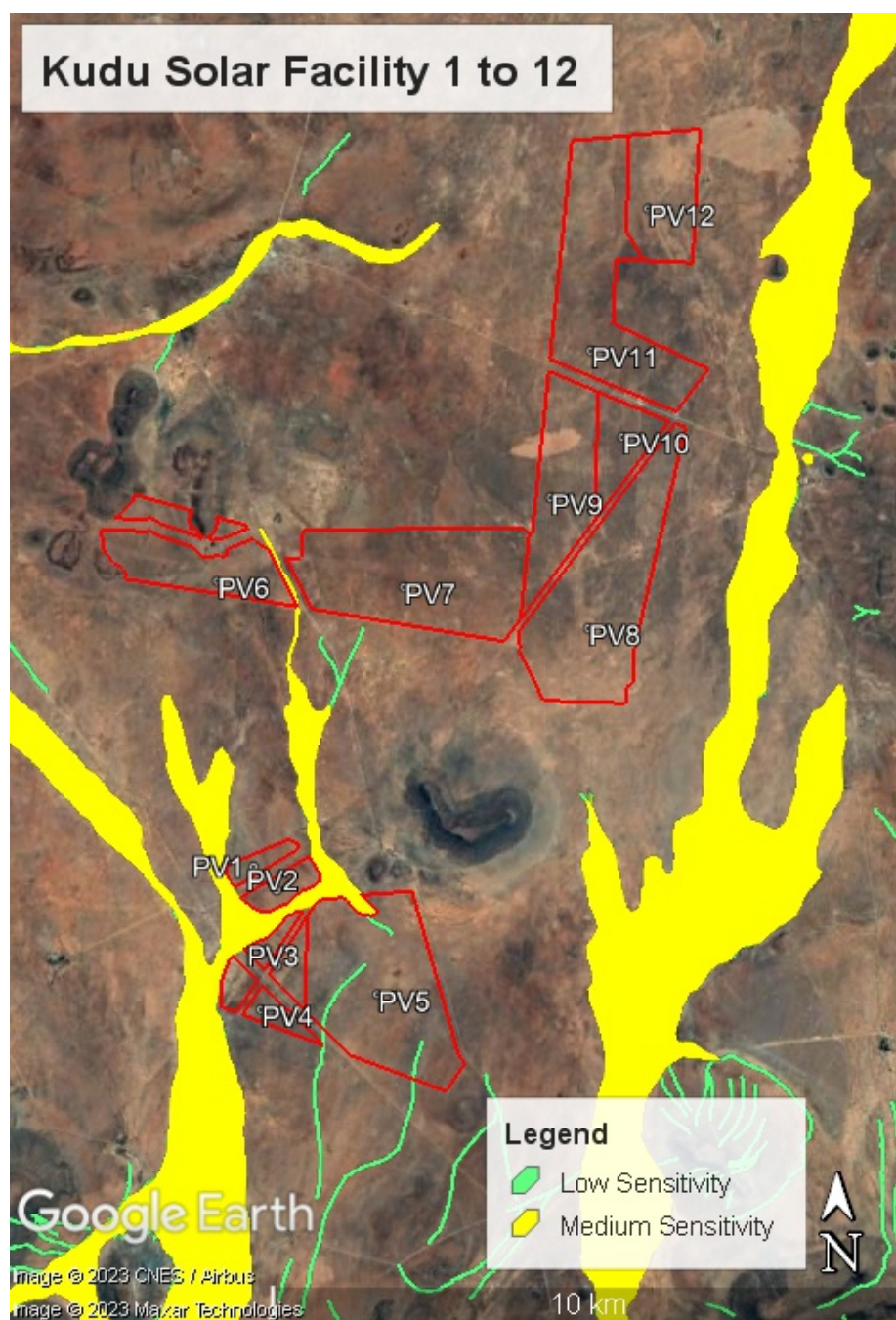


Figure 3-18: Mapped Aquatic Biodiversity Sensitivities within the study area following the SSV and detailed mapping. Yellow indicates medium sensitivity (i.e. unnamed tributaries of the Orange River, larger watercourses and their floodplains, and wetlands) and green indicates low sensitivity (i.e. smaller feeder streams, drainage lines and their floodplains) (Source: Belcher, 202312)

¹² Belcher, A. (2023). Aquatic Biodiversity and Species Scoping Level Assessment for the proposed Kudu Solar Facilities and associated infrastructure. Prepared for the Scoping and Environmental Impact Assessment (EIA) for the Kudu Solar Facilities and associated infrastructure. Chapter 8 of the EIA Report

3.2.8 Terrestrial Biodiversity

Various resources, such as, but not limited to, South African National Protected Areas Database (SAPAD), National Biodiversity Assessment (NBA), and the National Vegetation Map (VEGMAP) have been used to define the regional vegetation, water resources, fauna and anticipated ecological sensitivity of the study area. Details pertaining to the terrestrial environment is provided in the Terrestrial Biodiversity and Species Impact Assessment that is included in Chapter 7 of this EIA Report.




A site visit was undertaken in February 2022 and March 2022 (wet season) where the Terrestrial Biodiversity and sensitive flora aspects of the survey area were evaluated. During the field surveys performed, the habitats were evaluated, and a series of georeferenced photographs were taken of the habitat attributes. The field surveys focused on identifying dominant flora species, main habitat types as well as the actual and potential presence of SCC (either classified as Threatened by the International Union for Conservation of Nature (IUCN) (2022), protected by the National Environmental Management: Biodiversity Act (NEMBA) (2007, as amended) or other legislation applicable provincially or nationally).

3.2.8.1 Regional Vegetation

As noted above, the study area falls within the Nama Karoo and Grassland Biomes, covering three vegetation types, namely the Northern Upper Karoo (NKu3), the Eastern Upper Karoo (NKu4) and the Besemkaree Koppies Shrubland (Gh4) (Figure 3-19). The Northern Upper Karoo vegetation unit occupies the Northern regions of the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Philipstown, Petrusville and Petrusburg in the east. Bordered in the north by Niekerkshoop, Douglas and Petrusburg and in the south by Carnarvon, Pampoenpoort and De Aar. A few patches occur in Griqualand West. The Eastern Upper Karoo vegetation type is one of the largest vegetation types in the country and is found in the Northern, Western and Eastern Cape, between Carnarvon and Loxton in the west, De Aar, Petrusville and Venterstad in the north and Burgersdorp and Cradock in the east, and the Great Escarpment in the south. Besemkaree Koppies Shrubland occurs in the Northern Cape, Free State and Eastern Cape provinces on the plains of the Eastern Upper Karoo, between Richmond and Middelburg in the south and the Orange River in the north.

Proposed Kudu Solar PV facility (1 - 12)

near De Aar, Northern Cape Province, South Africa

-  Assessment study area (farm portions)
-  PV buildable areas (x12)
-  Assessment study area (EGI corridor)

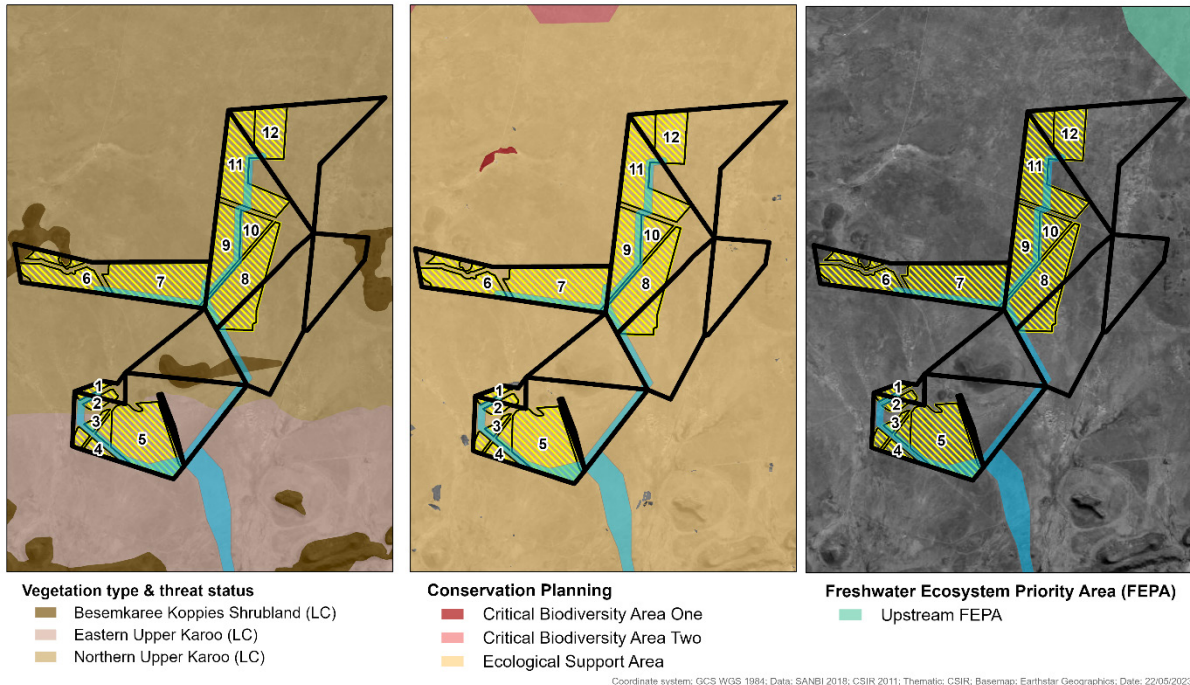


Figure 3-19: The study area and Buildable Areas in relation to Vegetation Types, Conservation Planning and Freshwater Ecosystem Priority Areas (FEPAs).

3.2.8.2 Biodiversity Conservation Planning

Critically Endangered and Threatened Ecosystems

Based on specialist input, no Critically Endangered, Threatened and/or Vulnerable Ecosystems appear to be present within the proposed project site.

Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are indicated in terms of the Northern Cape Critical Biodiversity Area Map, which was published in 2016 to update, revise and replace all older systematic biodiversity plans and associated products for the province. This was developed by the Northern Cape Department of Environment and Nature Conservation (currently operating as the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR)) by using a Systematic Conservation Planning approach. The Northern Cape DAEARDLR confirmed that the Northern Cape 2016 CBA Map serves as “CBAs identified in systematic biodiversity plans adopted by the competent authority”, as per the relevant listed activities in Listing Notice 3 of the 2014 NEMA EIA Regulations (as amended). Refer to Appendix F Part 3 for a copy of this correspondence from the Northern Cape DAEARDLR.

CBAs and ESAs together with Protected Areas are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole (Holness and Oosthuysen, 2016 in Enviro-Insight, 2023¹³).

CBAs are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBAs is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. Biodiversity priority areas are described as follows:

- CBAs are 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 conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBAs the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g., loss of populations or habitat). All FEPA prioritized wetlands and rivers have a minimum category of CBA1, while all FEPA prioritised wetland clusters have a minimum category of CBA2.
- ESAs are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for CBAs. For ESAs a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity). All natural non-FEPA wetlands and larger rivers have a minimum category of ESA.

Identified ESAs (2016 Northern Cape CBA Map) extend over a wide area in this specific region of the Northern Cape. The entire study area, and thus all identified buildable areas are located in an ESA (Figure 3-19). The ESA is due to the study area being located in the Platberg-Karoo Conservancy, the vegetation units and important wetland and river features. From a Terrestrial Biodiversity perspective, the Platberg-Karoo Conservancy and the vegetation units are important systems for grasslands and grassland associated animals, as well as important areas for the conservation of avifauna. This section of the Karoo has the highest rainfall and provides an ecotone between the Nama Karoo and Grassland biomes. More information on the Platberg-Karoo Conservancy is provided below.

¹³ Holness, S., & Oosthuysen, E. (2016). Critical Biodiversity Areas of the Northern Cape: Technical Report. In Enviro-Insight (2023). Terrestrial Biodiversity and Species Scoping Level Assessment for the proposed Kudu Solar Facilities and associated infrastructure. Prepared for the Scoping and Environmental Impact Assessment (EIA) for the Kudu Solar Facilities and associated infrastructure. Chapter 7 of the EIA Report.

Protected Areas

According to the South African Protected Areas Database (SAPAD), Quarter 2 (2022), the study area does not include any formally Protected Areas (Figure 3-20), as defined by the National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEM: PAA). This has also been confirmed by the DFFE Directorate: Protected Areas Planning and Management Effectiveness (Appendix F Part 3 of the EIA Report). The closest formally Protected Area is the Rolfontein Provincial Nature Reserve, which is located more than 30 km to the north-east of the study area. The Rolfontein Provincial Nature Reserve was declared in 1994, based on the information provided on SAPAD. The Tuinhoek Reserve and Grasberg Reserve lie directly adjacent to the Rolfontein Provincial Nature Reserve, and fall within the Free State, more than 40 km from the study area, towards the north-east. The Doornkloof Provincial Nature Reserve lies more than 50 km away from the study area, towards the south-east, in the Free State. In addition, the De Aar Nature Reserve lies more than 50 km away from the study area, towards the south-west, in the Northern Cape.

Proposed Kudu Solar PV facility (1 - 12)
 near De Aar, Northern Cape Province
 South Africa

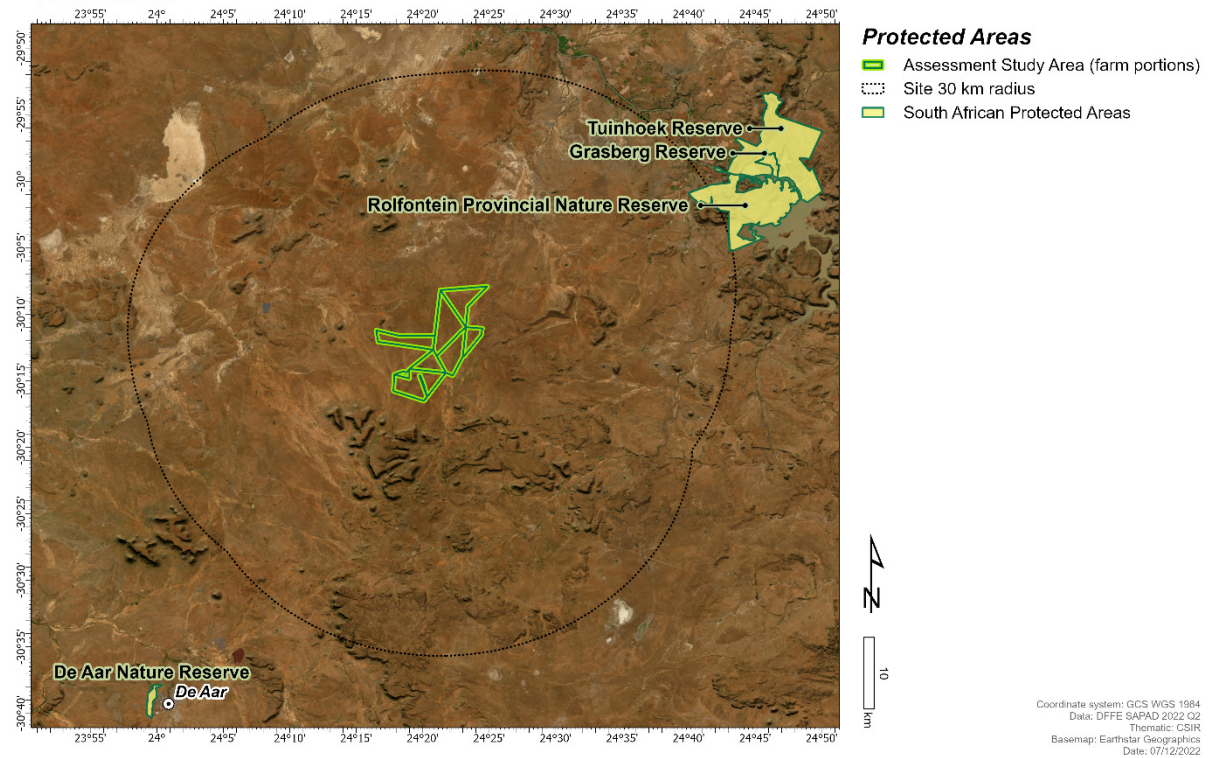


Figure 3-20: Protected Areas in relation to the Study Area

Conservation Areas

According to the South African Conservation Areas Database (SACAD), Quarter 2 (2022), the study area does not include any Conservation Areas.

National Protected Area Expansion Strategy (NPAES) Focus Areas

The NPAES focus areas for land-based protected area expansion are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large, Protected Areas. Representative of opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. There are no National Protected Area Expansion Strategy (NPAES) focus areas within the study area.

Important Bird and Biodiversity Areas

The study area is located in the Platberg-Karoo Conservancy¹⁴, which is regarded as an Important Bird and Biodiversity Areas (IBA).

The Platberg–Karoo Conservancy was established in July 1990. In collaboration with MD Anderson of DENC, various research and environmental awareness projects were initiated, including the Karoo Large Terrestrial Bird Survey, the Blue Crane Awareness Project and 11 years of colour-ringing Blue Crane chicks. The major threat of power-line collisions was initially investigated by the Eskom/EWT partnership and MD Anderson. This covered the impact of power lines on populations of large terrestrial bird species and evaluated the effectiveness of earth-wire marking devices.

The Platberg–Karoo Conservancy IBA covers the entire districts of De Aar, Philipstown and Hanover, including suburban towns. This IBA is in the Nama Karoo and Grassland Biomes. The land is used primarily for grazing and agriculture. Commercial livestock farming is mostly extensive wool and mutton production, with some cattle and game farming. Less than 5% of this IBA is cultivated under dry-land or irrigated conditions.

This IBA contributes significantly to the conservation of large terrestrial birds and raptors. These include Blue Crane *Anthropoides paradiseus*, Ludwig's Bustard *Neotis ludwigii*, Kori Bustard *Ardeotis kori*, Blue Korhaan *Eupodotis caerulescens*, Black Stork *Ciconia nigra*, Secretarybird *Sagittarius serpentarius*, Martial Eagle *Polemaetus bellicosus*, Verreaux's Eagle *Aquila verreauxii*, and Tawny Eagle *Aquila rapax*.

Refer to the Avifauna Assessment (Chapter 9 of this EIA Report) which provides detailed information on the proposed project and resultant potential impacts on birds.

¹⁴ A conservancy is a vehicle and platform for community-based conservation. It is a voluntary association of environmentally conscious land-owners and land-users who choose to cooperatively manage their natural resources in an environmentally sustainable manner without necessarily changing the land-use of their properties.

3.2.8.3 Fauna

A Compliance Statement was undertaken for the Terrestrial Animal Species (excluding Avifauna). Refer to Chapter 9 of the EIA Report for additional information. The Compliance Statement notes that the study area is in a natural or semi-natural state (due to presence of alien invasive species), and accordingly it is of a medium to low sensitivity for terrestrial animal species.

Leopard tortoise, Cape Ground Squirrel, Steenbok, Porcupine, Small-spotted genet, Springbok, Scrub hare, Common warthog, Bat eared fox, Puff Adder, Striped polecat, Cape cobra were recorded on site, and one animal SCC was recorded, namely Sable Antelope, however, since this is an introduced species, and it is believed that the species are from the adjacent property a full animal assessment is not required. The species could still be included as part of the construction and operational management plan, as the species moves between the two properties.

Almost all fauna species recorded within the study area are provincially protected, including species under Schedule 1 and 2 of the Northern Cape Nature Conservation Act (No. 9 of 2009). Should it be necessary to capture and relocate any of these animals prior to or during construction, or during the operational phase of the project, a permit application with the provincial authority is required.

3.2.8.4 Habitats and Terrestrial Plant Species

Four main habitats were identified within the study area based on species composition and structure following the desktop review and field-based assessments done by the specialists. These are listed below.

- Shrubby Grassland;
- White Grassland;
- Koppies; and
- Watercourse.

In addition, transformed areas were included which makes up existing roads, homesteads and bare soil.

The Terrestrial Biodiversity specialist has noted that many species found within the study area are widespread and not of any conservation concern but protected due to the fact that the Northern Cape Nature Conservation Act (2009) protects entire families of flowering plants irrespective of whether some members are rare or common. Refer to Chapter 7 for a list of plant SCC observed within the study area. The provincially protected species must either be relocated prior to construction or alternative measures made (depending on comments received from the provincial authority). A permit application is required for submission to the relevant provincial department where the proposed development will impact on these species.

The protected tree *Boscia albitrunca* occurs in the Shrubby Grassland at the base of a Koppie (in the vicinity of Kudu Solar Facility 6), and where individuals are impacted on by the approved layout, a permit application for destruction must be submitted to the Northern Cape DFFE. Currently the only known individual is excluded from development.

3.2.8.5 Screening Tool Descriptions and Site Sensitivity Verification

Figure 3-21, Figure 3-22 and Figure 3-23 below indicate the results of the Screening Tool in terms of terrestrial plant species, terrestrial animal species, and the terrestrial biodiversity combined sensitivity, respectively, for the proposed project.

The Screening Tool shows Low and Medium sensitivity for the Plant species theme due to suitable habitat for one SCC, namely *Tridentea virescens* (Figure 3-21). This species has an extensive, but very sporadic distribution from the south-eastern corner of Namibia to De Aar, Hopetown and Beaufort West in South Africa. Specimens are usually found in stony ground or hard loam in floodplains and they are often associated with shrubs of *Lycium* or *Rhigozum trichotomum*. No individuals were recorded during the survey within the study area. Even though *Lycium* and *Rhigozum* spp. are present throughout the study area, it does not always indicate suitable habitat for the species as the species tends to be sporadic. The species has a moderate likelihood of occurring on the study area, especially towards the northern boundary.

The Screening Tool shows that faunal populations for the study area are considered to be of medium sensitivity due to the presence of sensitive avifauna species (Refer to Section 3.2.9 of this chapter for additional information), while the remaining taxa groups are considered to be low sensitivity (Figure 3-22). Accordingly, only a compliance statement is required (refer to Chapter 7 for more details).

In terms of the terrestrial biodiversity combined sensitivity layer on the Screening Tool, the study area is shown to have a very high sensitivity due to the ESA designation (Figure 3-23).

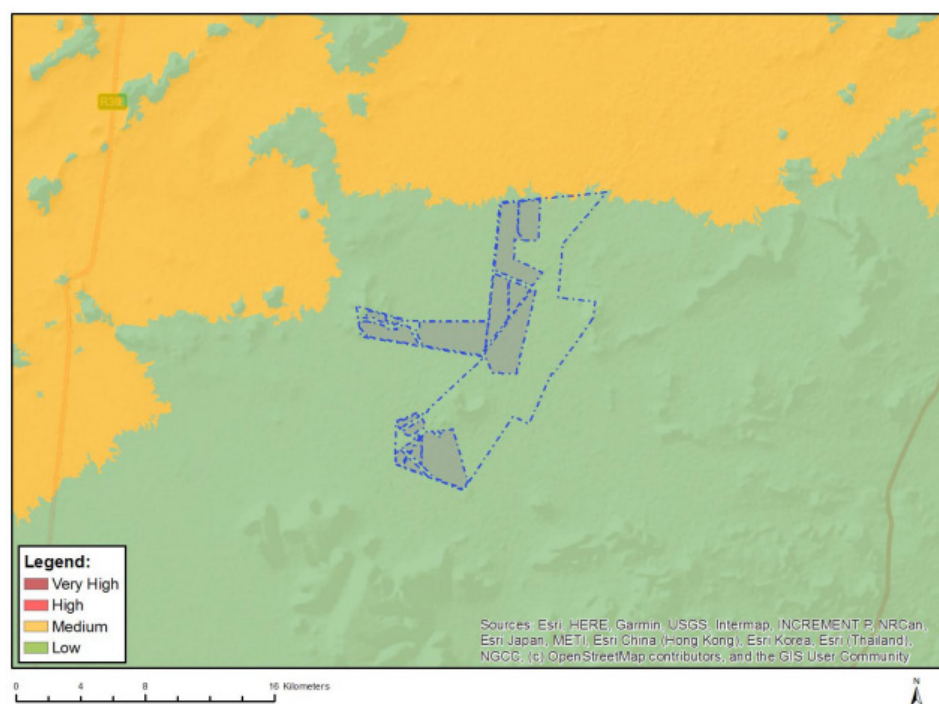


Figure 3-21: Terrestrial Plant Species sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)



Figure 3-22: Terrestrial Animal Species sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)

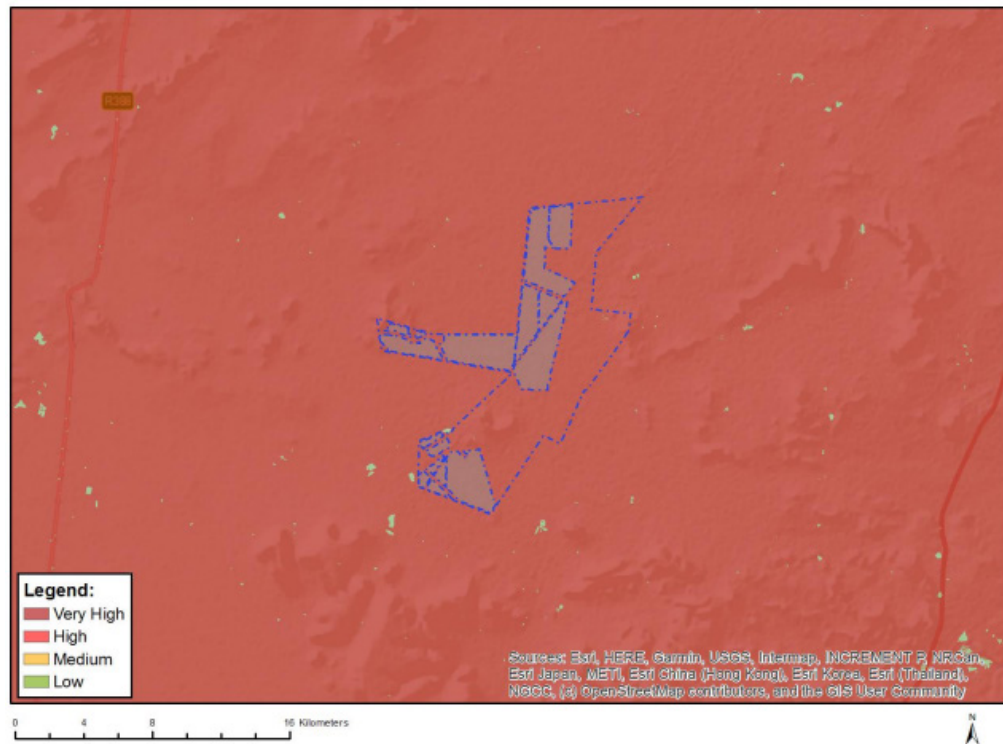


Figure 3-23: Terrestrial Biodiversity Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)

The Terrestrial Biodiversity Combined Sensitivity Theme is indicated as Very High on the Screening Tool due to the ESA. Terrestrial Biodiversity theme The ESA is due to the site being in the Platberg-Karoo Conservancy (not formally protected), the vegetation units and important wetland and river features. The Terrestrial Biodiversity theme therefore includes information on avifauna and aquatic features – the relevant specialist assessments with regards to these specific taxa and features must be read in combination with the Terrestrial Biodiversity and Species Report (Chapter 7 of the EIA Report) to report to obtain a holistic view of the environment and in order to determine and assess relevant impacts from the proposed project on these features and taxa. The vegetation itself is not considered sensitive but does provide important feeding and breeding habitat for fauna. The relevant buffers indicated in the Avifauna Assessment must be incorporated into the layout design, and where necessary these areas must be avoided from development. Important river and wetland features occur in the landscape, which are vital for ecosystem services, maintaining connectivity in the landscape, and act as important habitats for many fauna species. Accordingly, the overall sensitivity of the study area in terms of Terrestrial Biodiversity is considered medium, with some landscape features, including the Koppies, as High sensitivity. These features need to be excluded from development as identified by the relevant specialists (refer to aquatic and avifauna assessments).

For the Plant Species theme, the identified suitable habitat for *Tridentea virescens* had to be further assessed, and accordingly the medium sensitivity rating was upgraded to comply with a Terrestrial Plant Species Specialist Assessment. *Tridentea virescens* has been recorded previously near to De Aar and could possibly occur within the study area.

3.2.9 Avifauna

The information described below is based on inputs provided by the Avifauna Specialist, which are included in Chapter 9 of this EIA Report.

An integrated pre-construction monitoring programme has been implemented at the study area. The pre-construction avifaunal monitoring programme is following an adapted Regime 2 protocol as defined in the Birds and Solar Energy best practice guidelines (Jenkins et al. 2017 in Chris van Rooyen Consulting, 2023¹⁵) which require a minimum of two surveys over a six-month period. Both surveys have been conducted.

A total of 85 species could potentially occur within the Broader Area where the project is located. Of these, 21 are classified as priority species for solar developments. Of the 21 priority species, 17 were recorded during the monitoring so far, and 15 priority species have a medium to high probability of occurring regularly in the study area. Five Red Data species were recorded during the site surveys, namely Blue Crane, Martial Eagle, Verreaux's Eagle, Cape Vultures and White-backed Vulture. Refer to Chapter 9 of this EIA Report for a list of priority species potentially occurring in the study area and potential impacts on them by the proposed project.

¹⁵ Jenkins, A.R., Ralston-Patton, Smit- Robinson, A.H. 2017. Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa. BirdLife South Africa. In Chris van Rooyen Consulting (202). Avifauna Scoping Level Assessment for the proposed Kudu Solar Facilities and associated infrastructure. Prepared for the Scoping and Environmental Impact Assessment (EIA) for the Kudu Solar Facilities and associated infrastructure. Chapter 9 of the EIA Report.

3.2.9.1 Screening Tool Descriptions and Site Sensitivity Verification

In terms of the Screening Tool, the study area and immediate environment is classified as medium and low sensitivity for terrestrial animals according to the Terrestrial Animal Species Theme (Figure 3-22). The Buildable Areas specifically are classified as medium sensitivity. In a Screening Tool Report that was generated in February 2022, the medium classification was linked to the potential occurrence of Ludwig's Bustard (Globally and Regionally Endangered) and Verreaux's Eagle (Regionally Vulnerable). However, in a Screening Tool Report that was generated in May 2023 for the study area, the medium classification was linked to the potential occurrence of Ludwig's Bustard (Globally and Regionally Endangered) and Tawny Eagle (Regionally Endangered). The study area contains confirmed habitat for species of conservation concern (SCC) as defined in the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020). The occurrence of SCC was confirmed during the surveys so far i.e. Martial Eagle (Globally and Regionally Endangered), Verreaux's Eagle (Regionally Vulnerable), Blue Crane (Globally Vulnerable and Regionally Near-threatened), Cape Vulture (Globally Vulnerable and Regionally Endangered) and White-backed Vulture (Globally and Regionally Endangered) was recorded in the Study Area, as well as habitat for Secretarybird (Globally and Regionally Endangered) and Ludwig's Bustard.

Based on the SSV conducted on 28 March 2022 to 1 April 2022, the specialists concluded that the study area is of high sensitivity for avifauna from a solar perspective as the presence of SCC in the study area was confirmed during the surveys so far. Therefore, the medium and low sensitivity on the Screening Tool for avifauna is disputed and a high sensitivity finding is confirmed and more appropriate.

3.2.10 Visual Aspects and Sensitive Receptors

The information described below is based on inputs provided by the Visual Specialist, which are included in Chapter 10 of this EIA Report.

The visual assessment provides information on landscape, terrain, and vegetation, as well as other aspects such as land use and sensitive receptors. As described in Section 3.2.2 of this chapter, the study area lies within an expansive flattish landscape interspersed with dolerite-capped koppies and the small isolated *koppie* Basberg, which provide topographic relief.

The approach and methodology for the visual specialist study is based on the "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes" (Oberholzer, 2005), as well as a site visit undertaken by the specialists in March 2022, and the use of a 3D digital terrain model of the study area to determine the viewshed of the proposed project, as well as establishing a photographic record with the emphasis on views from potential sensitive receptors of the proposed project at varying distances, and panoramic photographs, which include GPS positions, to create the post-mitigation photomontages.

The assessment concluded that the viewshed, or zone of visual influence, potentially extends for some 5 km. Various potential scenic resources and sensitive receptors, such as farmsteads, as well as landscape features were identified within the study area and have been categorised into

no-go (very high), high, medium and low visual sensitivity zones, as well as buffers, for the proposed project. Refer to the Visual Impact Assessment for the visual sensitivity mapping categories and sensitivity findings.

3.2.10.1 Screening Tool Descriptions and Site Sensitivity Verification

The Screening Tool “Landscape” Combined Sensitivity Map as it relates to solar energy developments in the region is considered to be Very High in the northern and southern parts of the study area, where the very high sensitivities are mainly linked to slopes of more than 1:4., i.e. mountain tops and high ridges (Figure 3-24). These findings were partly disputed based on more detailed project-scale mapping of landscape features. A more accurate map of landscape features, along with recommended visual sensitivity buffers, has been prepared at the local project scale by the specialists and is included in Chapter 10 of the EIA Report.

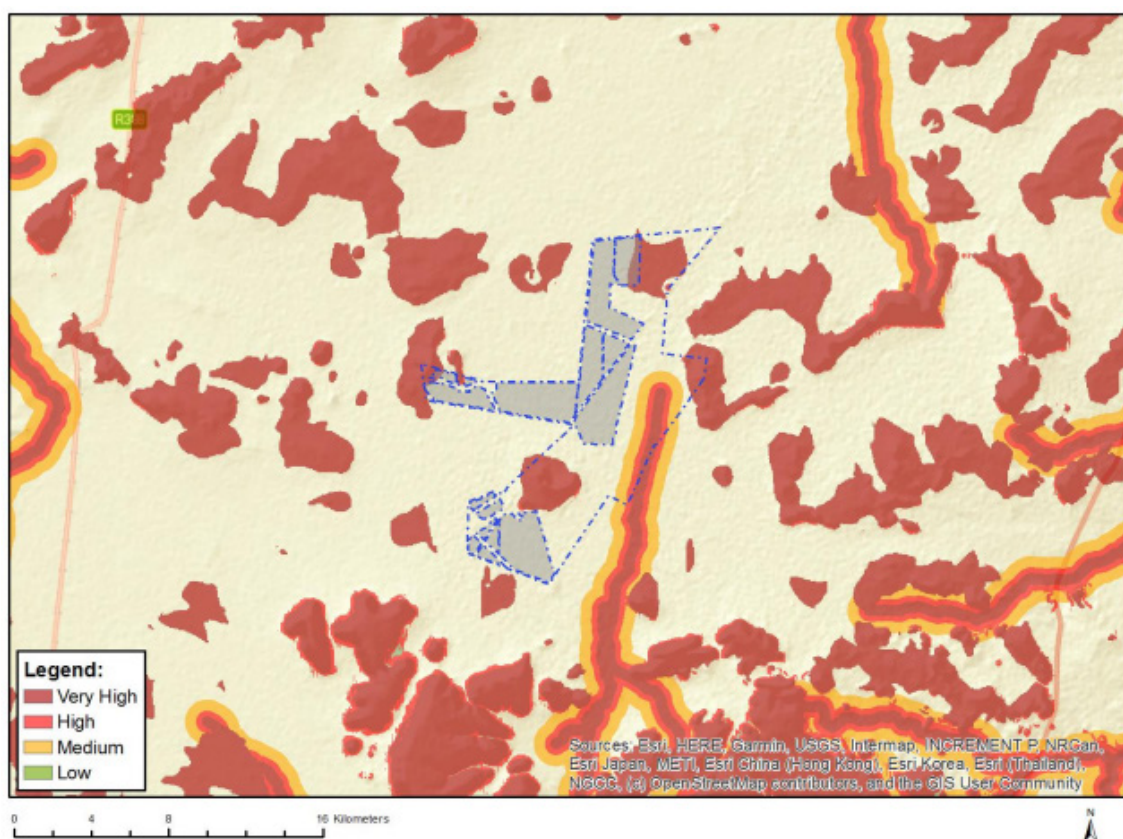


Figure 3-24: Potential Landscape (Solar) Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)

3.2.11 Heritage: Archaeology and Cultural Landscape

A detailed description of the archaeological features and cultural landscape within the study area and proposed project site is provided in the Heritage Impact Assessment that is included in Chapter 11 of this EIA Report.

Initial work was carried out using satellite aerial photography in combination with the specialist's accumulated knowledge of the wider Karoo landscape. This was used to determine areas most likely to be sensitive and that needed to be targeted during the survey. The subsequent fieldwork undertaken in April 2022 served to ground truth the study area, including areas identified as potentially sensitive. Desktop research was also used to inform on the heritage context of the area.

Heritage resources that have been allocated high and very high sensitivities by the survey, including but not limited to a graveyard, historical engravings, and a farmstead, were identified within the study area. Refer to Chapter 11 for an extensive list of heritage resources recorded during the survey.

3.2.11.1 Screening Tool Descriptions and Site Sensitivity Verification

Figure 3-25 indicates the archaeological and heritage sensitivity as assigned by the Screening Tool for the study area, as well as the Buildable Areas. The overall heritage sensitivity of the study area is considered to be low based on the Screening Tool. The site visit by the specialist showed that much of the study area is indeed of low sensitivity, but several pockets of higher sensitivity were found to occur. These are places where archaeological and other heritage resources were found and tended to be near farmsteads or dolerite outcrops. These areas are considered to be of variably medium to very high sensitivity. The heritage specialist thus disputes the Screening Tool findings in that a uniform low sensitivity is not applicable to the entire study area. Refer to Chapter 11 of the Heritage Assessment for a spatial distribution of these higher sensitivity areas. Details of the SSV are included in Chapter 11 of this EIA Report.

In all cases the Very High, High and Medium sensitivity areas are located outside of the development footprints (i.e. Buildable Areas). Most resources located within the study areas are cultural landscape components and are of low cultural significance and hence sensitivity. The only exceptions are an engraving consisting of a few small scratches and a pair of stone-lined farm reservoirs, both near Kudu Solar Facility 6 and both also of low sensitivity. It is preferred, however, that the reservoirs be retained because of their relationship with the adjoining ruined farmstead and for this reason they have been included in the medium sensitivity polygon around the farmstead. There are no other areas in any of the Buildable Areas that require avoidance on heritage grounds.

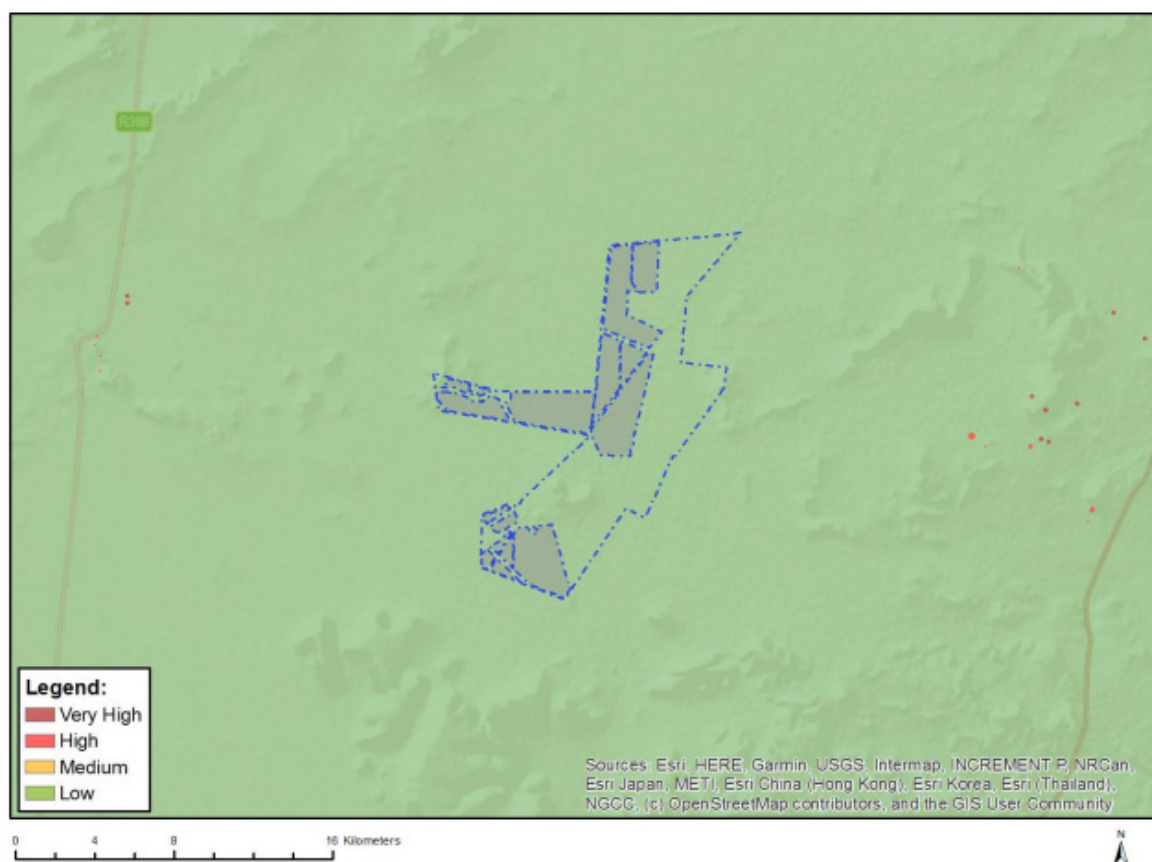


Figure 3-25: Archaeology and Cultural Heritage Combined Sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)

3.2.12 Palaeontology

The information described below is based on the SSV provided by the Palaeontologist, which is included in Chapter 12 of this EIA Report.

The study area largely comprises low-relief terrain mantled with thick Late Caenozoic calcrete hardpans, alluvial deposits, surface gravels and soils that are generally of low palaeo-sensitivity. Natural bedrock exposure here is very limited and mainly involves unfossiliferous dolerite as well as baked Eccca Group metasediments (probable Waterford Formation) building *kranzes* on upper hillslopes that will not be directly impacted by the proposed project. Early to Middle Permian basinal mudrocks of the Tierberg Formation (Eccca Group, Karoo Supergroup) underlie the majority of the study area but are rarely exposed and, where seen, are generally weathered, friable and extensively disrupted by near-surface calcrete veins. The offshore mudrocks of the Tierberg Formation are not known elsewhere to have a rich fossil record. In the study area, the potential for well-preserved fossils is further reduced by near-surface weathering, calcrete veining as well as baking of sedimentary bedrocks by intensive regional dolerite intrusion in Early Jurassic times. The only fossils recorded from the Eccca Group sediments during the 2-day palaeontological site visit comprise sparse, low diversity trace fossil assemblages of low scientific or conservation interest. Thick sandy to gravelly alluvial deposits associated with long-established drainage lines are extensively calcretised. No fossil remains were recorded within them.

3.2.12.1 Screening Tool Descriptions and Site Sensitivity Verification

According to the Screening Tool, the study area ranges from Medium to High palaeontological sensitivity (Figure 3-26). Based on several previous desktop and field-based Palaeontology Impact Assessment (PIA) studies undertaken in the broader De Aar - Kimberley region, as well as the 2-day palaeontological site visit, the Screening Tool sensitivity allocations have been contested by the specialist. It is concluded that the study area is in fact of Low to Very Low palaeo-sensitivity overall, thus disputing the Medium to High sensitivity of the Screening Tool (Figure 3-26). However, the potential for rare, largely unpredictable fossil sites of High palaeo-sensitivity associated with older alluvial and pan deposits in the subsurface cannot be entirely discounted. Most such fossil sites would probably be protected during construction by environmental buffer zones along drainage lines. If any fossiliferous deposits are exposed by surface clearance or excavations during the construction phase of the development, the Chance Fossils Finds Protocol (included in Chapter 12 of the EIA Report) should be fully implemented. These recommendations are also included in the Environmental Management Programmes (EMPrs) for the proposed project (Appendix I and Appendix J of this EIA Report).

Therefore, the project area for all the solar PV facilities, on-site substations, grid connection corridors and associated infrastructure are of low to very low palaeo-sensitivity.

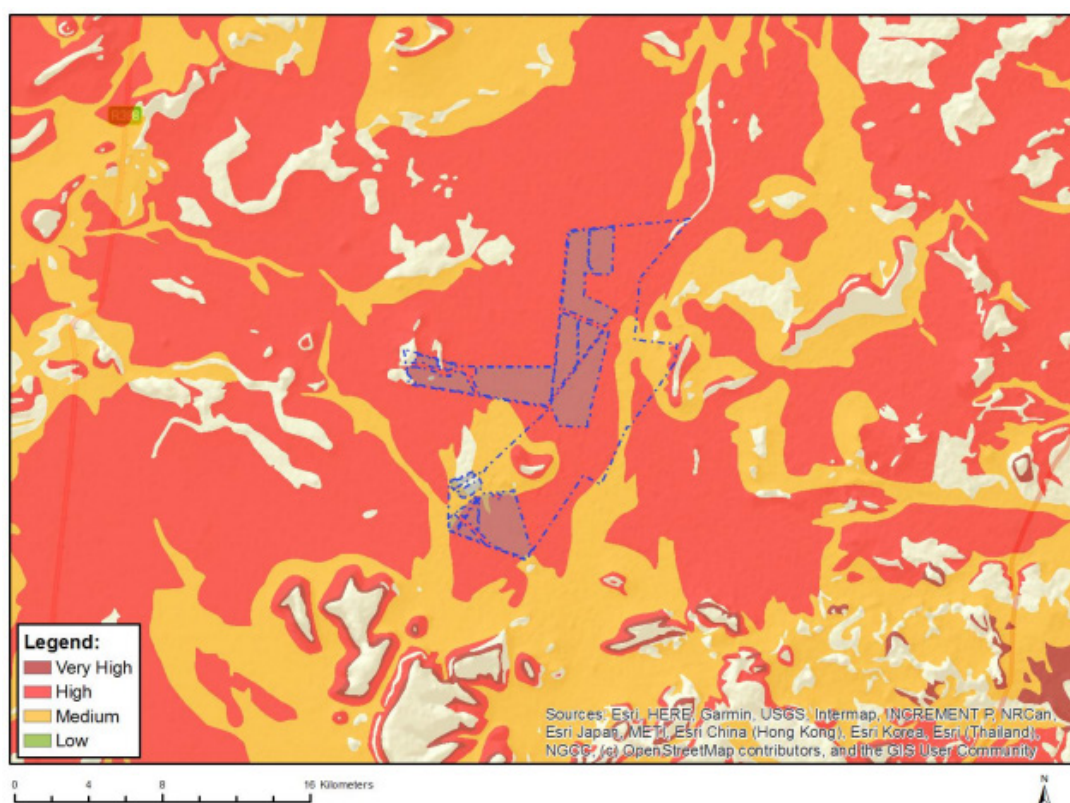


Figure 3-26: Palaeontology sensitivity of the study area and Buildable Areas based on the Screening Tool. (Source: DFFE Screening Tool, 2023)

3.3 Socio-Economic Environment

The available data used to compile the socio-economic baseline for the RLM, PKSDM, and De Aar area, although not exhaustive, is interpreted in terms of professional opinion and is indicative of generally accepted trends within the Northern Cape Province and the broader South Africa.

The information described below is based on inputs provided by the Socio-Economic Specialist, which are included in Chapter 13 of this EIA Report, as well as a review of various planning documents such as IDPs and SDFs.

3.3.1 Regional Context – Pixley ka Seme District Municipality

As noted above, the study area is located within the RLM, which falls within the PKSDM in the Northern Cape Province. The PKSDM covers an area of 103 222 km² and is made up of eight Category B local municipalities which include Emthanjeni, Kareeberg, Thembelihle, Renosterberg, Siyathemba, Ubuntu, Siyancuma and Umsobomvu municipalities. De Aar is the administrative seat of the PKSDM.

3.3.1.1 Demographics and Economic Profile

According to the Statistics South Africa (StatsSA) Community Survey of 2016 (StatsSA, 2016)¹⁶, the PKSDM had a population of 211 108 in 2016 (Table 3-2), which subsequently increased to 220 830 in 2019 (PKSDM District Development Model (DDM), 2020¹⁷). Of this, the largest (64 900) age category was the young working age (25-44), whilst at 16 200 the smallest category was 65 and over (StatsSA, 2016²⁸). Per the national census of 2011, in terms of race groups, Coloureds made up 59.6% of the population in the PKSDM, followed by Black Africans (30.9%), Whites (8.8%), and Asians (0.66%) (StatsSA, 2012¹⁸). The main language spoken in 2011 was Afrikaans (78%), followed by Xhosa (17%) and Setswana (2%) (StatsSA, 2012³⁰).

With a Gross Domestic Product (GDP) of R 12.5 billion in 2019 (up from R 6.67 billion in 2009), the PKSDM contributed 12.21% to the Northern Cape Province GDP in 2019 (PKSDM DDM, 2020²⁹). The Community Services sector was the largest economic sector in 2019 within the PKSDM, at R 3.31 billion of the total Gross Value Added (GVA) (PKSDM DDM, 2020²⁹). The transport sector (tertiary) was the second largest economic sector in the PKSDM, accounting for 13.6% of the GVA in 2019, followed by followed by the agriculture sector (primary) with 13.4% (PKSDM DDM, 2020²⁹).

¹⁶ Statistics South Africa (2016). Community Survey 2016, Statistical release P0301 / Statistics South Africa. Pretoria: Statistics South Africa, 2016. Available at: http://cs2016.statssa.gov.za/wp-content/uploads/2016/07/NT-30-06-2016-RELEASE-for-CS-2016-_Statistical-releas_1-July-2016.pdf [online]. Accessed November 2022.

¹⁷ Pixley Ka Seme District Municipality District Development Model. 2019. Available at: https://www.cogta.gov.za/ddm/wp-content/uploads/2020/07/Pixley_Ka_Seme_District_Profile_.pdf [online]. Accessed: November 2022.

¹⁸ Statistics South Africa (2012). Census 2011 Municipal report – Northern Cape/ Statistics South Africa. Pretoria: Statistics South Africa, 2012. Available at: http://www.statssa.gov.za/census/census_2011/census_products/NC_Municipal_Report.pdf [online]. Accessed November 2022.

Table 3-2: Total population of the PKSDM, RLM, Northern Cape, and National for the period 2006 – 2016 (Sources: StatsSA 2016²⁸ and the Comparative Analysis for PKSDM, (Northern Cape Provincial Treasury, 2019¹⁹)

Region →	PKSDM	RLM	Northern Cape	National Total	RLM as a % of the DM	RLM as a % of the province	RLM as a % of national
Year ↓							
2006	177 559	10 081	1 094 500	47 800 000	5.6%	0.92%	0.021%
2016	211 108	12 458	1 193 780	55 908 900	6.09%	1.04%	0.024%

3.3.1.2 Social Characteristics

Unemployment and inequality remain a challenge within the PKSDM (PKSDM IDP, 2022²⁰). The district had an unemployment rate of 28.3% in 2011, which is lower than South Africa's national unemployment rate of 33.9% (PKSDM IDP, 2022³²). However, the district has a higher (35.4%) youth unemployment rate (ages 15 to 34) than the national average. The Coloured population recorded the highest unemployment rate when comparing the race groups in the district, where females in general had a higher unemployment rate than males (PKSDM IDP, 2022³²).

Based on the 2011 Census data, approximately 11% of households in the PKSDM had no income, whereas 3.4% of households earned up to R4800 per annum (StatsSA, 2012³⁰). The majority of households (61%) had a monthly income of less than R3500, whilst 24.8% earned less than R15 000 per month. This means that 90% of households in the PKSDM had a monthly income that is lower than that of the average South African household (R11 514) (StatsSA, 2012³⁰). The COVID-19 pandemic likely impacted income levels and increased the number of households in the PKSDM that live close to or below the poverty line.

In the PKSDM, 82.3% of households lived in formal housing in 2017 and only 0.32% of households resided in traditional dwellings (Northern Cape Provincial Treasury, 2019³¹). Approximately 10.8% of households resided in informal dwellings.

3.3.2 Local Context – Renosterberg Local Municipality

The RLM is the smallest of eight municipalities in the district, making up only 5% or 5 529 km² of its geographical area. The RLM derives its name from Afrikaans meaning "rhinoceros mountain". The municipality is named after the mountain range found in the area. It was formed through the amalgamation of three towns, that is, Petrusville, Vanderkloof and Phillipstown. The administrative

¹⁹ Northern Cape Provincial Treasury (2019). Comparative Analysis for Pixley ka Seme District Municipality. Available at:

[http://www.ncpt.gov.za/Portals/0/Pixley%20ka%20Seme%20Comparative%20Analysis%202019_compressed%20\(1\).pdf?ver=GwVZk3xUoqrh7HGZaFtZ8Q%3d%3d](http://www.ncpt.gov.za/Portals/0/Pixley%20ka%20Seme%20Comparative%20Analysis%202019_compressed%20(1).pdf?ver=GwVZk3xUoqrh7HGZaFtZ8Q%3d%3d) [online]. Accessed: November 2022. ISBN: 978-0-621-47166-3

²⁰ Pixley Ka Seme District Final Integrated Development Plan (IDP) 2022 – 2027. 2022. Available:

[https://www.pksgdm.gov.za/idps/PKSDM%20Final%20Integrated%20Development%20Plan%20\(IDP\)%202022-2027.pdf](https://www.pksgdm.gov.za/idps/PKSDM%20Final%20Integrated%20Development%20Plan%20(IDP)%202022-2027.pdf). [online] Accessed: November 2022

seat of the RLM is Petrusville. Table 3-3 provides an overview of various key statistics for the RLM.

Table 3-3: Key statistics for the RLM for 2016, 2011, and 2001 (StatsSA, 2011²¹ and 2016²⁸)

KEY STATISTICS	YEAR		
	2016	2011	2001
Total population	11 818	10 976	9 070
Young (0-14)	27.4%	32.8%	32.9%
Working Age (15-64)	66.5%	61%	61%
Elderly (65+)	6.1%	6.2%	6.5%
Dependency ratio	No data	64%	65.1%
Gender ratio	No data	95,8	94.7
Growth rate	1.7%	1.91%	-0.78%
Population density	No data	2 persons/km ²	No data
Unemployment rate	No data	26.8%	48.9%
Youth unemployment rate	No data	29.8%	55.8%
No schooling aged 20+	11.4%	16%	26.1%
Higher education aged 20+	5%	6.6%	6.1%
Matric aged 20+	32.7	21,8%	12.4%
Number of households	3 563	2 995	2 448
Number of Agricultural households	No data	616	No data
Average household size	3.3	3.4	3.7
Female headed households	No data	34.8%	30.3%
Formal dwellings	85.1%	94.7%	91.1%
Housing owned/paying off	No data	52.3%	67.9%
Flush toilet connected to sewerage	77.4%	71.7%	37.7%
Weekly refuse removal	54.9%	74.4%	72.9%
Piped water inside dwelling	43.3	53.4%	43.8%
Electricity for lighting	86.3%	88.1%	72.1%

3.3.2.1 Demographics and Economic Profile

The population of the RLM in 2016 was 11 818, thereby accounting for the smallest share (6%) in the district (StatsSA 2016²⁸). Approximately 40.9 % of the population was under the age of 20, approximately 52.60% were between 20 and 64, and about 6.3% were 65 and older in 2011 (StatsSA, 2011³³) (Figure 3-27). The RLM therefore has a relatively large young population. This creates challenges in terms of creating employment opportunities.

²¹ StatsSA, 2011, Renosterberg. Available: https://www.statssa.gov.za/?page_id=993&id=renosterberg-municipality [online]. Accessed November 2022.

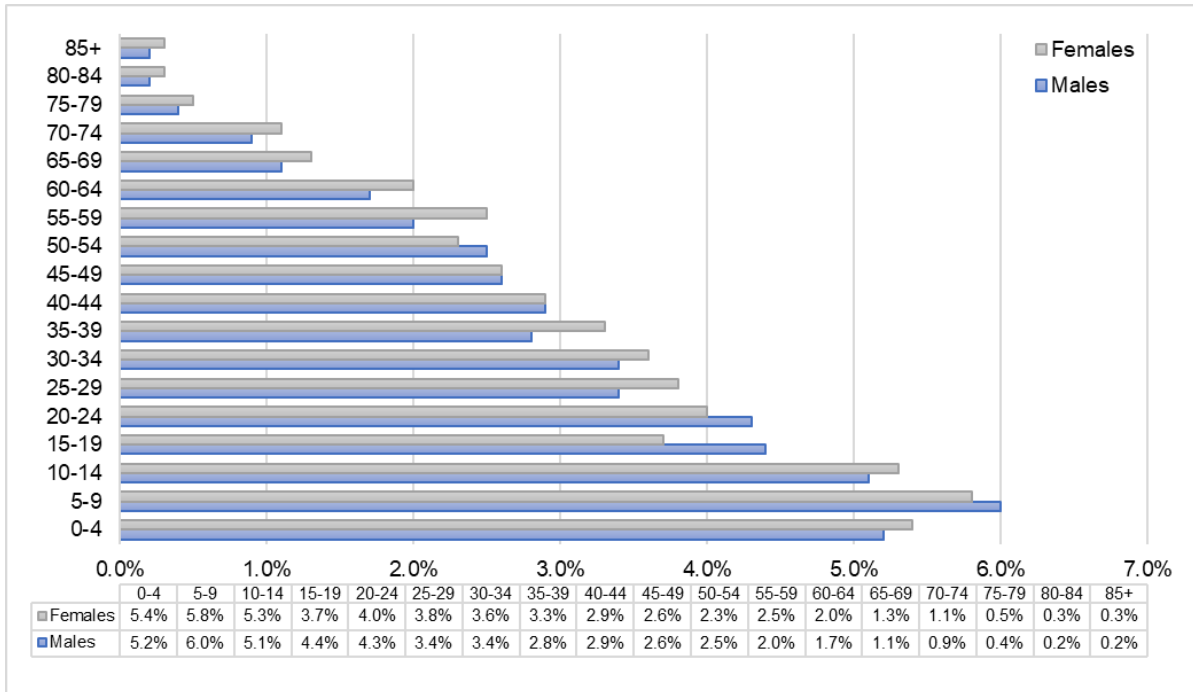


Figure 3-27: Gender and age distributions within the RLM (Redrawn based on StatsSA, 2011³³).

In terms of race groups, Coloureds made up about 57.4% of the population, followed by Black Africans (32.9%) and Whites (8.6%) in 2011 (Figure 3-28). In 2011, the main first language spoken in the RLM was Afrikaans (71%), followed by IsiXhosa (23.9%) and Sesotho (1.2%).

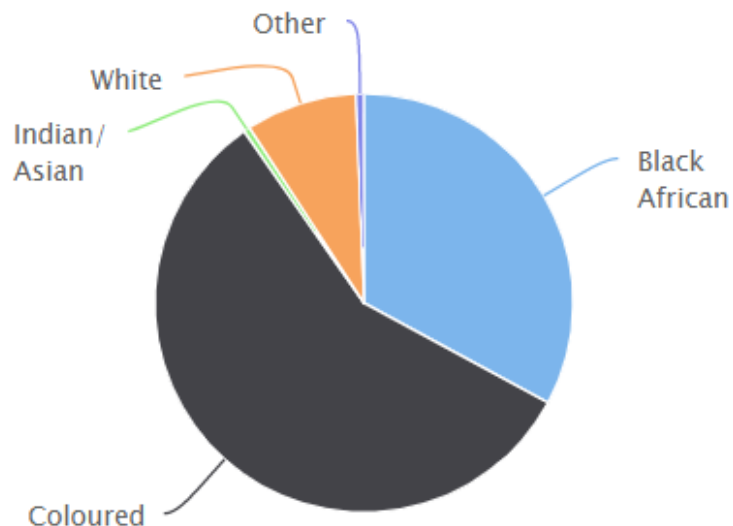


Figure 3-28: Population groups within the RLM (StatsSA, 2011³³).

The RLM contributed 4.7% to the PKSDM GDP in 2017 (Northern Cape Provincial Treasury, 2019³¹). This is the lowest GDP contribution per LM to PKSDM when compared to the remaining seven regions within the district. Additionally, the RLM had the third lowest annual economic growth at 4.44% in 2017 when compared to the remaining regions within the district (Northern Cape Provincial Treasury, 2019³¹). In terms of contributions by LMs to the economic industry totals for the PKSDM, the RLM made the largest contribution to electricity at 31.6% in 2007.

3.3.2.2 Education

In terms of the highest education level for all ages in 2011, approximately 3.1 % had no schooling, 51.2% had some Primary education, 7.2 % completed Primary School, 26.7 % had some Secondary education, 10.6 % completed Secondary education, and 0.8 % had Higher education (StatsSA, 2011³³). The relatively poor education levels in the RLM pose a potential challenge for economic development.

3.3.2.3 Employment and Income

The RLM has the largest percentage of unemployment in the district at 31% (Pixley ka Seme District, 2014⁸). The figures of the 2011 Census also indicate that the majority of the population are not economically active, namely 41.8% (Figure 3-29). These figures are substantially higher than the official unemployment rate for the Northern Cape Province (14.5%) and PKSDM (14.8%). This reflects the limited employment opportunities in the area, which in turn are reflected in the low income and high poverty levels. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in the RLM. Recent figures released by Stats SA also indicate that South Africa's unemployment rate is in the region of 36%. The youth unemployment rates are closer to 50%.

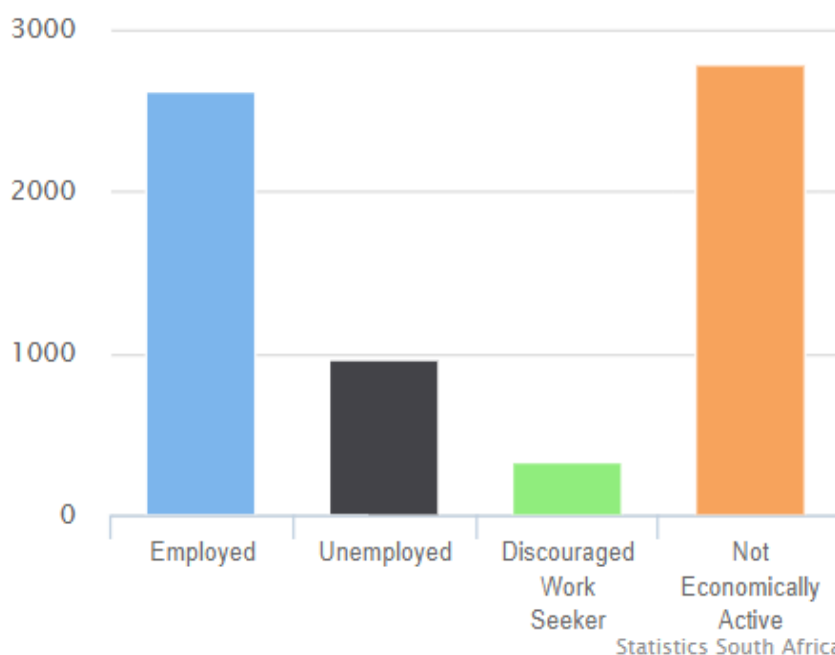


Figure 3-29: Employment status (ages 15 – 64) within the RLM (StatsSA, 2011³³).

Based on the data from the 2011 Census, 11.2% of the population of the RLM had no formal income, 4% earned less than R4 800, 6.4% earned between R4 801 and R9 600 per annum, 23.1% between R9601 and R19 600 per annum, and 23.4% between R19 601 and R38 200 per annum (StatsSA, 2011³³) (Figure 3-30). Based on the poverty gap indicator produced by the World Bank Development Research Group, in the region of 70% of the households in the RLM live close to or below the poverty line. This figure is higher than the provincial level of 62.9%. The low-income levels reflect the limited employment opportunities in the area and dependence on the agricultural sector. This is also reflected in the high unemployment rates.

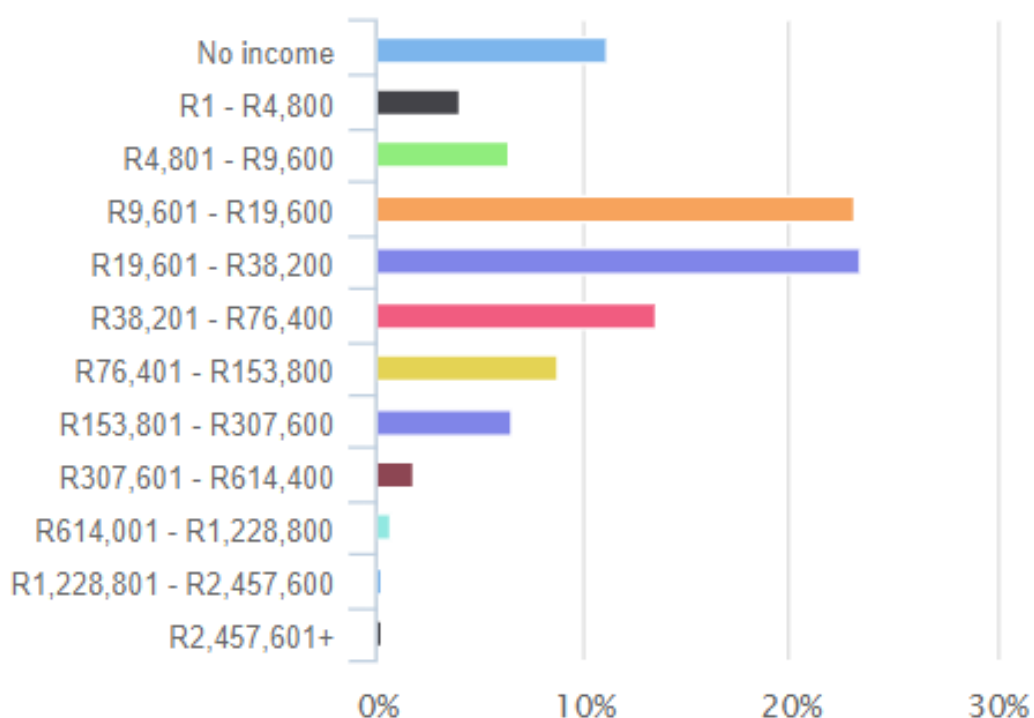


Figure 3-30: Average household income within the RLM (StatsSA, 2011³³).

Household income levels are likely to have been impacted by the COVID-19 pandemic. The number of households in the RLM and PKSDM that live close to or below the poverty line is likely to have increased over the last 18 months. This, coupled with the high dependency ratio, is a major cause of concern for the area. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the RLM. This in turn impacts on the ability of the RLM to maintain and provide services.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15 - 64). The dependency ratios for the RLM, Northern Cape, and national in 2011 was 64%, 55.7%, and 52.7% (StatsSA, 2011³³). The higher dependency ratio of the RLM reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality. The high dependency ratio also highlights the importance to maximising local employment opportunities and the key role played by training and skills development programmes.

3.3.2.4 Health and Community Services

The PKSDM is served by 3 District Hospitals, 8 Community Health Centres, 28 Primary Health Care Clinics, 4 satellite clinics and 1 mobile clinic, distributed over the district. The RLM has 1 District Hospital and 6 Primary Health Care clinics. There are no community health centres within RLM that provide a 24-hour service. A new hospital was built in De Aar and was opened in 2017. The Central Karoo Hospital serves as the referral hospital for the district.

In terms of education the RLM has 16 schools of which 13 are no-fee schools. The RLM also has libraries.

3.3.2.5 Municipal Services

Access to services is generally high across the RLM in 2011. The majority of households have access to electricity for lighting (88.1%), municipal water supply (79.9%), flush toilets connected to sewerage (71.7%), and refuse removal (74.4%) (Figure 3-31).

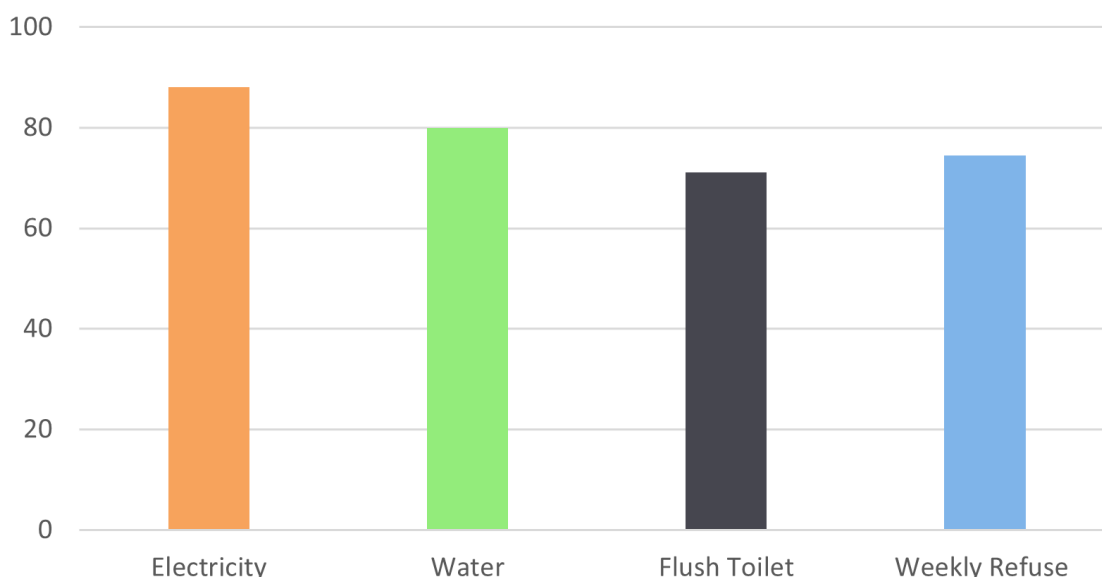


Figure 3-31: Percentage of households with access to basic services within the RLM (StatsSA, 2011³³).

3.3.3 Study Area Context

The proposed project is located approximately 60 km north of De Aar. De Aar, which means “the artery”, was founded in 1904, and is the second most important railway junction in the country. Rail lines linking Gauteng, Cape Town, Gqeberha (formerly Port Elizabeth) and Namibia all pass through the town. The decline of the railway sector over the last 20 years has impacted negatively on the towns economy. De Aar also has the largest abattoir in the Southern Hemisphere and supplies all the major centres throughout the entire country with the famous “Karoo” lamb and mutton. Apart from meat production, the sheep farms around De Aar are also major suppliers of wool. The town is total dependant on boreholes for its water supply.

The smaller settlements of Philipstown and Petrusville are located approximately 24 km and 22 km to the south-east and east of the study area respectively. Orania and Hopetown are located approximately 35 km and 64 km to the north and north-west of the study area respectively.

The Gariiep (Orange) River and Vanderkloof Dam are located approximately 35 km to the north-east of the site. The landscape associated with the study area is a typical Karoo landscape consisting of dolerite koppies and ridges separated by valley bottoms. The land uses are linked to livestock farming, specifically sheep farming.

3.4 Eco-Tourism Activities

The information described below is based on inputs provided by the Socio-economic Specialists, which is included in Chapter 13 of this EIA Report.

The RLM consists of three towns, namely Petrusville (administrative centre), Philipstown, and Vanderkloof. It is located along the Orange River and adjoining the Vanderkloof Dam. The locality of the area along the Orange River provides a sustainable water resource that offers various development opportunities in terms of tourism and agriculture. The nearest nature reserves are in the vicinity of Vanderkloof, which is located more than 30 km to north-east of the study area. The main focus of Vanderkloof is for residential and recreational purposes and the town is a well-established holiday resort town. The tourism potential of the town and the surrounding area are linked to the water sports activities in the Vanderkloof Dam (boating, swimming, fishing etc.), and the Vanderkloof and Rolfontein Nature Reserves. In contrast, Philipstown's tourism potential is linked to farm stays and hunting. There are also a number of San Rock Art sites in the area.

At a local level, there are a limited number of tourism facilities located in the study area. None of the affected or adjacent farm properties offer safari or game watching facilities, farm stay accommodation, or other tourism is associated with the study area. However, several properties offer annual (winter) hunting opportunities, where Jakkalskuil is the only operation primarily focused on international hunters.

3.5 Civil Aviation

The Screening Tool has indicated that the study area is of low sensitivity as it relates to Civil Aviation (Figure 3-32). The low sensitivity was verified during a site visit undertaken in August 2022, whereby no civil aviation features or installations were found within the study area. Therefore, as required by GN 320, a Civil Aviation SSV was compiled and is included in Chapter 18 of this EIA Report. Additionally, in line with GN 320, no further requirements are applicable i.e., a Civil Aviation Compliance Statement is not required.

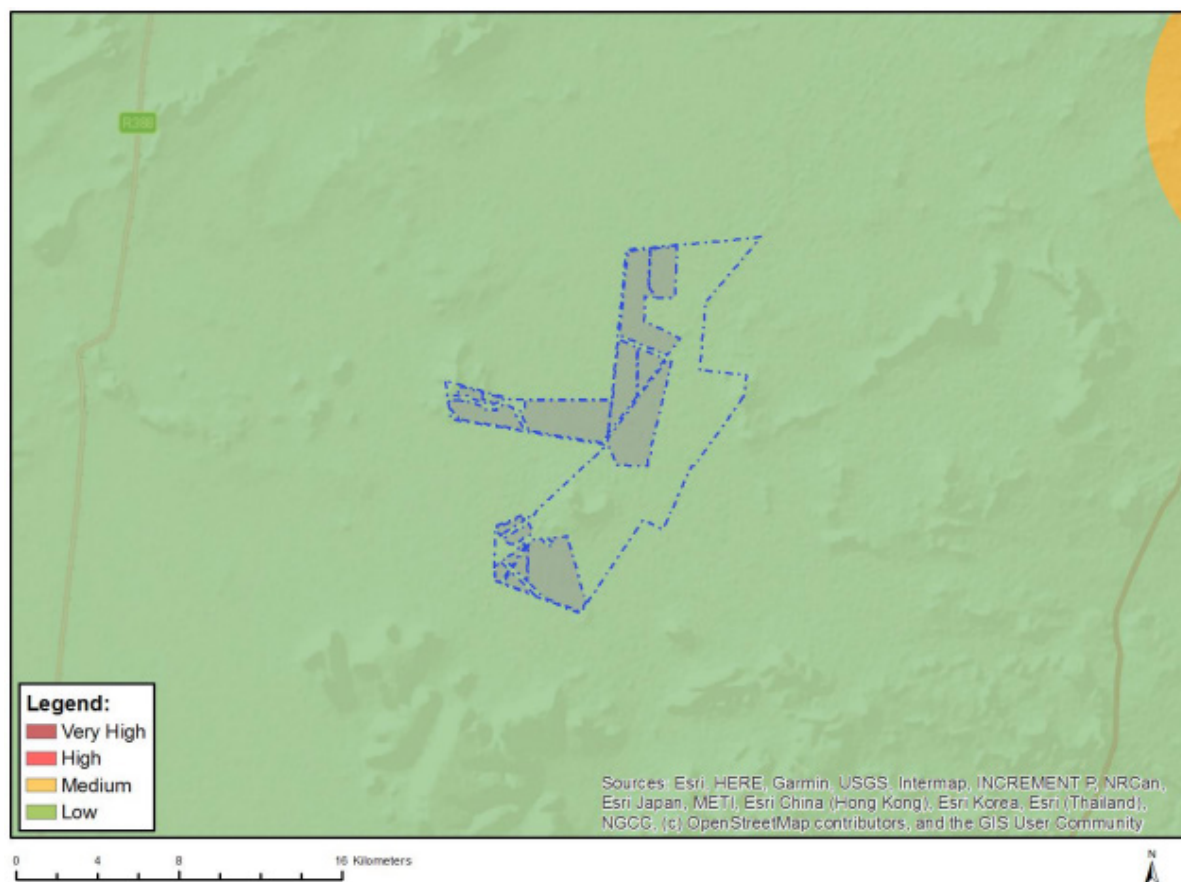


Figure 3-32: Civil Aviation sensitivity of the study area based on the Screening Tool. The Revised Scoping Buildable Areas are shown in grey (Source: Screening Tool, 2022)

3.6 Defence

The Screening Tool has indicated that the study area is of low sensitivity as it relates to Defence (Figure 3-33). The low sensitivity was verified during a site visit undertaken in August 2022, whereby no defence features or installations were found within the study area. Therefore, as required by GN 320, a Defence SSV was compiled and is included in Chapter 19 of this EIA Report. Additionally, in line with GN R320, no further requirements are applicable i.e., a Defence Compliance Statement is not required.

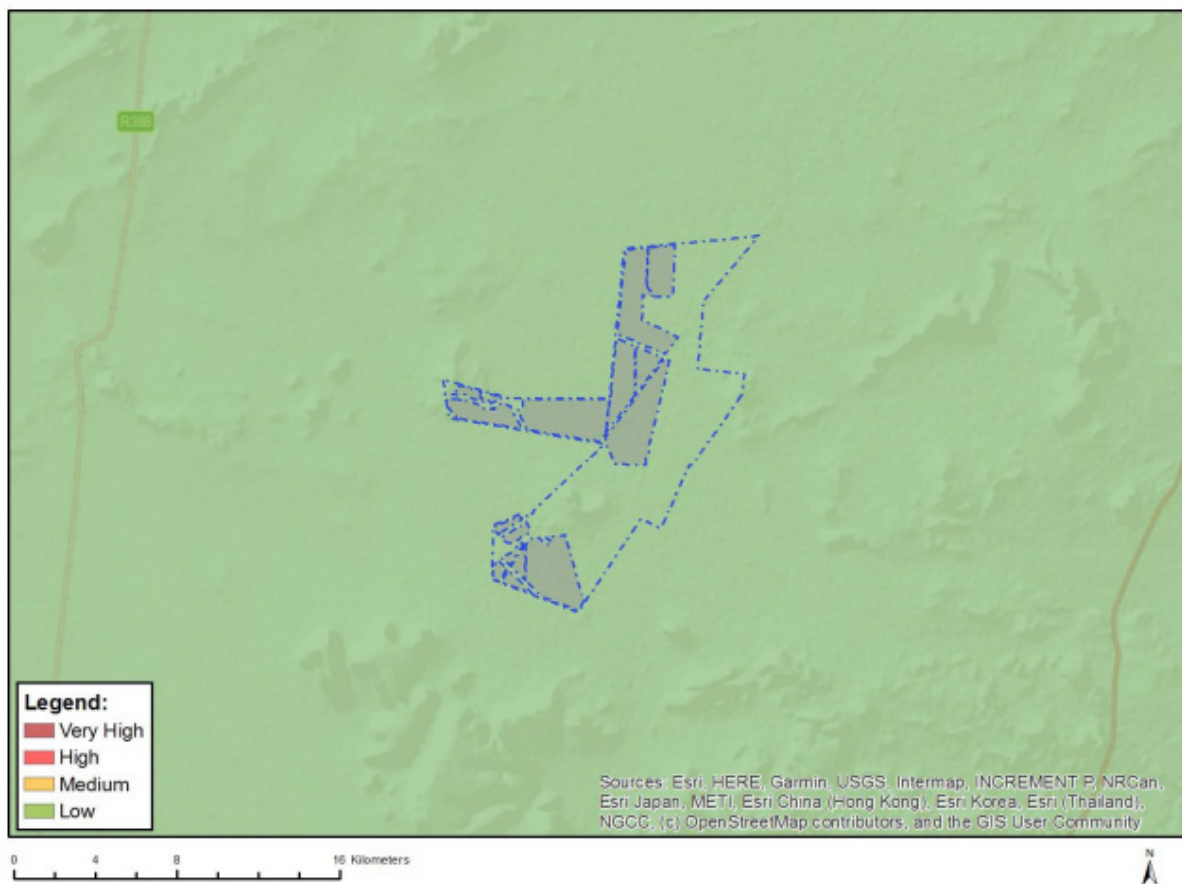


Figure 3-33: Defence sensitivity of the study area and Buildable Area based on the Screening Tool (Source: DFFE Screening Tool, 2023)



CHAPTER 4:

Approach to EIA Process and Public Participation

CONTENTS

4.	<u>APPROACH TO THE EIA PROCESS AND PUBLIC PARTICIPATION</u>	4-4
4.1	Purpose of EIA and Requirements of the EIA Regulations	4-4
4.2	Legislation, Policies and Guidelines Pertinent to this EIA	4-5
4.2.1	National Legislation	4-5
4.2.1.1	The Constitution of the Republic of South Africa (Act 108 of 1996)	4-5
4.2.1.2	NEMA and EIA Regulations	4-6
4.2.1.3	GN 960 (published 5 July 2019)	4-7
4.2.1.4	GN 320 (published 20 March 2020)	4-7
4.2.1.5	GN 1150 (published on 30 October 2020)	4-8
4.2.1.6	National Environmental Management: Biodiversity Act (Act 10 of 2004)	4-8
4.2.1.7	The National Heritage Resources Act (Act 25 of 1999)	4-11
4.2.1.8	National Forests Act (Act 84 of 1998)	4-14
4.2.1.9	Conservation of Agricultural Resources Act (Act 43 of 1983)	4-14
4.2.1.10	Subdivision of Agricultural Land Act (Act 70 of 1970)	4-15
4.2.1.11	National Water Act (Act 36 of 1998)	4-15
4.2.1.12	Water Services Act (Act 108 of 1997)	4-17
4.2.1.13	Hazardous Substances Act (Act 15 of 1973)	4-18
4.2.1.14	National Environmental Management: Waste Act (Act 59 of 2008, as amended) (NEMWA)	4-18
4.2.1.15	National Environmental Management: Air Quality Act (Act 39 of 2004)	4-18
4.2.1.16	Astronomy Geographic Advantage (Act 21 of 2007)	4-19
4.2.1.17	Development Facilitation Act (Act 67 of 1995)	4-20
4.2.1.18	Other Applicable Legislation	4-21
4.2.2	Provincial Legislation	4-21
4.2.2.1	Northern Cape Nature Conservation Act (Act 9 of 2009)	4-21
4.2.2.2	Northern Cape Strategic Plan 2020-2025	4-22
4.2.2.3	Northern Cape Provincial Spatial Development Framework (2018)	4-23
4.2.3	District and Local Planning Legislation	4-23
4.2.3.1	Environmental Management Framework	4-23
4.2.3.2	PKSDM Integrated Development Plan (IDP)	4-23
4.2.3.3	Guidelines, Frameworks and Protocols	4-24
4.2.4	International Finance Corporation Performance Standards	4-25
4.3	Legal Context for this EIA	4-25
4.4	Screening Tool	4-33
4.4.1	Additional Specialist Assessments	4-36

4.4.2 RFI Assessment _____	4-37
4.5 Overview of Approach to Preparing the EIA Report and EMPr _____	4-38
4.6 Public Participation Process _____	4-39
4.6.1 Introduction to the PPP _____	4-39
4.6.2 Requirement for a Public Participation Plan _____	4-42
4.6.3 Pre-Application Consultation with the DFFE _____	4-42
4.6.4 Landowner Written Consent _____	4-42
4.6.5 Site Notices _____	4-42
4.6.6 Key Steps of the PPP for the EIA Phase _____	4-43
4.6.6.1 Task 1 – I&AP Review of the EIA Report and EMPr (Current Phase)	4-43
4.6.6.2 Task 2 – Comments and Responses Report _____	4-47
4.6.6.3 Task 3 – Compilation of the Final EIA Reports for Submission to DFFE	4-47
4.6.6.4 Task 4 – Environmental Authorisation (EA) and Appeal Process ____	4-47
4.7 Authority Consultation during the EIA Phase _____	4-48
4.8 Schedule for the Scoping and EIA Processes _____	4-49
4.9 Approach to the Impact Assessment Methodology and Specialist Assessments _____	4-50
4.9.1 Impact Assessment Methodology _____	4-50
4.9.2 Cumulative Impact Assessment Methodology _____	4-56
4.10 Terms of Reference for the Specialist Assessments _____	4-62

TABLES

Table 4.1:	Listed Activities in GN R327, GN R325, and GN R324 that will be potentially triggered by the proposed project. _____	4-29
Table 4.2:	List of Specialist Assessments identified by the Screening Tool for the proposed project. _____	4-33
Table 4.3:	Site Notice Board Placement for the Proposed Projects. _____	4-43
Table 4.4:	Authority Communication Schedule. _____	4-49
Table 4.5:	Schedule for the proposed Kudu Solar Facilities 1 to 12 (Projects 1 to 12). ____	4-49
Table 4.6:	Example of Table for Assessment of Impacts/Risks. _____	4-56
Table 4.7:	Renewable energy and EGI projects, located within 30 km of the proposed Kudu Solar Facilities, that are considered in the Cumulative Impact Assessment (Source: DFFE REEA, Quarter 4, 2022; and SAHRIS). _____	4-58

FIGURES

Figure 4.1.	Overview of the Scoping and EIA Process and PPP. _____	4-41
Figure 4.2.	Guide to assessing risk/impact significance as a result of consequence and probability. _____	4-54
Figure 4.3.	Renewable Energy projects within the 30 km radius considered for the Cumulative Impact Assessment (Source: DFFE REEA Quarter 4, 2022; and SAHRIS). ____	4-61

4. APPROACH TO THE EIA PROCESS AND PUBLIC PARTICIPATION

This chapter presents the approach followed for the impact assessment phase of the Environmental Impact Assessment (EIA) Process, for the Kudu Solar Facility 1 (hereafter referred to as the “Kudu Solar Facility” or “proposed project”¹), and gives particular attention to the legal context and guidelines that apply to this EIA, the steps in the Public Participation component of the EIA, in accordance with Regulations 41, 42, 43 and 44 of Government Notice (GN) R326 of the 2014 National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (as amended), and the schedule for the EIA Process. The EIA Phase is shaped by the findings of the Scoping Process. For information from the Scoping Phase, including the approach to stakeholder engagement, identification of issues, overview of relevant legislation, and key principles and guidelines that provide the context for this EIA Process, refer to the Final Scoping Report (FSR) (CSIR, 2023²).

4.1 Purpose of EIA and Requirements of the EIA Regulations

As captured in Section 2 of Appendix 3 of the 2014 NEMA EIA Regulations (as amended), which specifies the content requirements for EIA Reports, “the purpose of the EIA Phase 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 development footprint on the approved site as contemplated in the accepted scoping report;
- Identify the location of the development footprint within the approved site as contemplated in the accepted scoping report 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: (aa) can be reversed; (bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

¹ Note that an integrated PPP is being undertaken for all the Kudu Solar Facilities and EGI Projects, hence in some cases this is referred to as “proposed projects”.

² CSIR, 2023. Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and associated infrastructure, near De Aar in the Northern Cape Province. Final Scoping Report. CSIR Report Number: CSIR/SPLA/SECO/ER/2022/0051/B.

- Identify, assess and rank the potential impacts that the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report 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.”

The EIA Phase consists of three parallel and overlapping processes:

- Central assessment process through which inputs are integrated and presented in an EIA Report that is submitted for approval to the National Department of Forestry, Fisheries and the Environment (DFFE) and other commenting authorities;
- Undertaking of a Public Participation Process (PPP) whereby findings of the EIA Phase are communicated and discussed with Interested and Affected Parties (I&APs) and responses are documented; and
- Undertaking of specialist assessments that provide additional information or assessments required to address the issues raised in the Scoping Phase.

The EIA process is a planning, design and decision-making tool used to demonstrate to the responsible authority, the DFFE, and the Project Applicant, what the consequences of their choices will be in biophysical, social, and economic terms. As such it identifies potential impacts (negative and positive) that the project may have on the environment. The EIA makes recommendations to mitigate negative impacts and enhance positive impacts associated with the proposed project.

4.2 Legislation, Policies and Guidelines Pertinent to this EIA

The scope and content of this EIA Report has been informed by the main legislation, policies, guidelines and information series documents described in this section. Additional information on applicable legislation is provided in the Specialist Assessments included in Chapters 6 to 17 of this EIA Report.

4.2.1 National Legislation

4.2.1.1 *The Constitution of the Republic of South Africa (Act 108 of 1996)*

The Constitution, which is the supreme law of the Republic of South Africa, provides the legal framework for legislation regulating environmental management in general, against the backdrop of the fundamental human rights. Section 24 of the Constitution states that:

- *“Everyone has the right:*
 - *to an environment that is not harmful to their health or well-being; and*
 - *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that –*
 - *prevent pollution and ecological degradation;*
 - *promote conservation; and*
 - *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”*

Section 24 of the Bill of Rights therefore guarantees the people of South Africa the right to an environment that is not detrimental to human health or well-being, and specifically imposes a duty on the State to promulgate legislation and take other steps that ensure that the right is upheld and that, among other things, ecological degradation and pollution are prevented.

In support of the above rights, the environmental management objectives of the proposed project are to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the study area³.

4.2.1.2 NEMA and EIA Regulations

Chapter 1, Section 2 of the NEMA sets out several principles to give guidance to developers, private landowners, members of the public and authorities. The proclamation of the NEMA gives expression to an overarching environmental law. Various mechanisms, such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin NEMA. NEMA, as the primary environmental legislation, is complemented by many sectoral laws governing marine living resources, mining, forestry, biodiversity, protected areas, pollution, air quality, waste and integrated coastal management. Principle number 3 determines that a development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, *inter alia* i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

Section 24 (1) of the NEMA, as amended states that "*In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the Competent Authority charged by this Act with granting the relevant EA*". The reference to "listed activities" in Section 24 (1) of NEMA relates to the regulations promulgated in GN R982, R983, R984 and R985 in Government Gazette (GG) 38282, dated 4 December 2014, which came into effect on 8 December 2014. These were amended in GN R326, R327, R325 and R324 in GG 40772, dated 7 April 2017. GN R326 contains the regulations for the Environmental Assessment Process. GN R327 and GN R324 includes listed activities that trigger the need for a Basic Assessment (BA) Process, whereas GN R325 includes listed activities that trigger the need for a full Scoping and EIA Process.

³ The preferred site for the proposed Kudu Solar Facility comprises the full extent of the affected farm portions which cover a combined footprint of 8 150 ha, which serves as the study area for this Scoping and EIA Process. Therefore, the terms "site" and "study area" are used synonymously in the report. The Buildable Areas and "development footprint" fall within the preferred site (or study area).

The 2014 NEMA EIA Regulations (as amended) were further amended as follows:

- GG 41766, GN 706 on 13 July 2018;
- GG 43358, GN 599 on 29 May 2020;
- GG 44701, GN 517 on 11 June 2021; and
- GG 45999, GN 1816 on 3 March 2022.

Based on the transitional arrangements, these amendments (where they have been commenced with) apply to the proposed project as the original Application for Environmental Authorisation (EA) was not submitted before the above amendments took effect (where relevant). The relevant amendments have been taken into consideration in this Scoping and EIA Process.

In terms of the NEMA and the 2014 NEMA EIA Regulations (as amended), a Scoping and EIA Process is required for the proposed development of the Kudu Solar Facility and associated infrastructure. Refer to Section 4.3 of this chapter for additional information on the 2014 NEMA EIA Regulations (as amended).

4.2.1.3 GN 960 (published 5 July 2019)

GN 960 was published on 5 July 2019 and came into effect for compulsory use of the National Web Based Environmental Screening Tool (hereafter referred to as the Screening Tool) from 4 October 2019. The notice outlines the requirement to submit a report generated by the Screening Tool, in terms of Section 24(5)(h) of the NEMA and Regulation 16(1)(b)(v) of the 2014 NEMA EIA Regulations (as amended), when submitting an Application for EA in terms of Regulations 19 and 21 of the 2014 NEMA EIA Regulations (as amended). As such, the proposed project was run through the Screening Tool, and the associated reports generated and attached to the Application for EA, which was submitted to the DFFE with the Draft Scoping Report (DSR) on 9 December 2022. A comment was received from the DFFE Chief Directorate: Integrated Environmental Authorisations during the 30-day review period on the DSR, which explained that individual Screening Tool Reports must be provided for each project, and signed, as opposed to one report with all twelve proposed projects. As such, individual Screening Tool Reports were generated showing the proposed development footprint at the Scoping Phase. However, the original Screening Tool Reports have still been included for background and context as it shows the entire study area or preferred site that has been assessed for all projects. Updated Screening Tool Reports were also run for the finalised development footprint (at the Draft EIA Report phase). The individual Screening Tool Reports have been included as an appendix to the Amended Application for EA, and in Appendix K of this EIA Report. In addition, the findings of the Screening Tool Report are discussed in the Specialist Assessments as relevant, in Chapters 6 to 19 of this EIA Report, as well as Chapter 3 and 4 of this EIA Report.

4.2.1.4 GN 320 (published 20 March 2020)

GN 320 prescribes the general requirements for undertaking site sensitivity verifications and protocols for the assessment and minimum report content requirements for identified environmental impacts for environmental themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA, when applying for EA. The protocols were enforced within a period of 50 days of publication of the notice i.e., on 9 May 2020.

The Specialist Assessments undertaken as part of this Scoping and EIA Process have complied with GN 320, where applicable, specifically Agriculture, Terrestrial Biodiversity, and Aquatic Biodiversity. Some of the remaining specialist assessments comply with Appendix 6 of the 2014 NEMA EIA Regulations (as amended), and where relevant, Part A of GN 320 which contains site sensitivity verification requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed. This specifically applies to the Visual; Heritage (Archaeology and Cultural Heritage); Palaeontology; Socio-Economic; Traffic; Geohydrology; and Geotechnical Assessments. However, in some instances there are no themes on the Screening Tool that relate to some of these studies and as such sensitivities cannot be verified against the Screening Tool. More information in this regard is included in Chapters 6 to 19 of this EIA Report, which also address the aspect of Site Sensitivity Verifications, where relevant and applicable. Some of the specialist assessments comply with the Assessment Protocols published in GN R1150 on 30 October 2020, specifically Terrestrial Biodiversity and Species and Avifauna (as described below). The Battery Energy Storage System (BESS) High Level Safety, Health and Environment Risk Assessment serves as a technical report, and the aforementioned legislation will thus not be applicable.

The site sensitivity verifications for Civil Aviation and Defence also comply with GN 320. Additional detail on Civil Aviation and Defence is included in Chapters 18 and 19 of this EIA Report.

4.2.1.5 GN 1150 (published on 30 October 2020)

GN 1150 prescribes procedures and protocols in respect of specific environmental themes for the assessment of, as well as the minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA, when applying for EA. GN 1150 includes a protocol for the specialist assessment and minimum report content requirements for environmental impacts on a) terrestrial animal species and b) terrestrial plant species. The requirements of these protocols apply from the date of publication (i.e., from 30 October 2020), except where the Project Applicant provides proof to the Competent Authority that the specialist assessment affected by these protocols had been commissioned prior to the date of publication of these protocols in the GG, in which case Appendix 6 of the 2014 NEMA EIA Regulations (as amended) will apply to such applications.

The Terrestrial Biodiversity and Species Assessment undertaken as part of this Scoping and EIA Process was commissioned following the publication date of the Species Protocols. Therefore, the Terrestrial Animal and Plant Species components have been undertaken in compliance with GN 1150. As communicated during the Scoping Phase, one combined report has been compiled for Terrestrial Biodiversity, Terrestrial Animal Species and Terrestrial Plant Species. The Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species Assessment is included in Chapter 7 of this EIA Report. The Avifauna Assessment also complies with GN 1150, as relevant.

4.2.1.6 National Environmental Management: Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) (NEMBA) provides for “the management and conservation of South Africa’s biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, and the use of indigenous biological resources in a sustainable manner, amongst other provisions”. The Act states that the state is the custodian of South Africa’s biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.

Overall, the NEMBA focuses on the protection of national biodiversity through the regulation of activities that may affect biodiversity including habitat disturbance, culture of and trade in organisms, both exotic and indigenous. Lists of threatened ecosystems (Sections 52 (1) (a)), threatened and protected species (Sections 56 (1)), and alien invasive organisms (Section 97 (1)) have been published and maintained in terms of NEMBA.

Chapter 1 sets out the objectives of the Act, and they are aligned with the objectives of the Convention on Biological Diversity, which are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of genetic resources. The Act also gives effect to CITES, the Ramsar Convention, and the Bonn Convention on Migratory Species of Wild Animals. The State is endowed with the trusteeship of biodiversity and has the responsibility to manage, conserve and sustain the biodiversity of South Africa.

This Act therefore serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. Effective disturbance and removal of threatened or protected species encountered on or around the sites, will require specific permission from the applicable authorities.

Furthermore, NEMBA states that the loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes *inter alia* the loss of endangered, threatened or protected plant and animal species.

4.2.1.6.1 Threatened Ecosystems

GG 34809, GN 1002, published on 9 December 2011 in terms of Section 52 (1) (a) of the NEMBA, provides a list of threatened terrestrial ecosystems categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Protected.

However, a revised national list of ecosystems that are threatened and in need of protection was published in GG 47526, GN 2747 on 18 November 2022 in terms of Section 52 (1) (a) of NEMBA. The revised list includes threatened terrestrial ecosystem types that are classed as CR, EN and VU.

The list of threatened ecosystems includes threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a listed vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. In addition, Listing Notice 3 (GN R324) of the 2014 NEMA EIA Regulations (as amended) includes Listed Activity 12, for the clearance of an area of 300 m² or more of indigenous vegetation in the Northern Cape, specifically within any CR or EN ecosystem listed in terms of Section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as CR in the National Spatial Biodiversity Assessment 2004.

As explained in the Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report), the vegetation within the study area falls within the Northern Upper Karoo (NKu3), Eastern Upper Karoo (NKu4), and Besemkaree Koppies Shrubland (Gh4) (Mucina and Rutherford 2006). These vegetation types are classified as **Least Threatened**, and therefore the above GN and Listed Activity does not apply.

4.2.1.6.2 Threatened and Protected Species

The 2007 Threatened or Protected Species Regulations of the NEMBA declares species of high conservation value, national importance or that are considered threatened and in need of protection. Furthermore, the regulations provide for the prohibition of specific restricted activities involving specific listed threatened or protected species.

The list of CR, EN, VU or Protected species was published in GG 29657, GN R151 on 23 February 2007 in terms of Section 56 (1) of the NEMBA. The list was further amended in GG 30568, GN R1187 on 14 December 2007, as well as in GG 43386, GN R627 of 3 June 2020. Should a project include threatened and protected species that are listed, actions in terms of NEMBA are triggered.

Based on the site sensitivity verification undertaken by the Terrestrial Biodiversity Specialists, the following faunal species were recorded within the larger study area:

- *Hippotragus niger niger*, Sable Antelope, Vulnerable, Provincially Protected;
- *Stigmochelys pardalis*, Leopard tortoise, Least Concern, Provincially Protected;
- *Xerus inauris*, Cape Ground Squirrel, Least Concern, Provincially Protected;
- *Raphicerus campestris*, Steenbok, Least Concern, Provincially Protected;
- *Hystrix africaeaustralis*, Porcupine, Least Concern, Provincially Protected;
- *Genetta genetta*, Small-spotted genet, Least Concern, Provincially Protected;
- *Antidorcas marsupialis*, Springbok, Least Concern, Provincially Protected;
- *Lepus saxatilis*, Scrub hare, Least Concern, Provincially Protected;
- *Phacochoerus africanus*, Common warthog, Least Concern, Provincially Protected;
- *Otocyon megalotis*, Bat eared fox, Least Concern, Provincially Protected;
- *Bitis arietans*, Puff Adder, Least Concern;
- *Ictonyx striatus*, Striped polecat, Least Concern, Provincially Protected; and
- *Naja nivea*, Cape cobra, Least Concern.

4.2.1.6.3 Alien and Invasive Species

Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the landowner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

The Alien and Invasive Species Regulations, published in 2014 and amended in 2020, in terms of the NEMBA provides for the protection of biodiversity through the control and eradication of listed alien and invasive species categorised as follows:

- Category 1a Listed Invasive Species – must be combatted or eradicated;
- Category 1b Listed Invasive Species – must be controlled or 'contained' in accordance with the requirements of an Invasive Species Management Programme;
- Category 2 Listed Invasive Species – require a permit to carry out a restricted activity e.g., cultivation within an area;
- Category 3 Listed Invasive Species – species that are less-transforming invasive species, but introduction, trade or transportation should be limited. Category 3 plant species are automatically Category 1b species where located within riparian and wetland areas;
- Exempted Alien Species – species that are not regulated; and
- Prohibited Alien Species – species for which a permit for restricted activities (e.g., inter alia hunting, gathering, breeding, cultivating, trading, transporting) may not be issued.

The Alien and Invasive Species List was published in terms of sections 66(1), 67(1), 70(1)(a), 71(3) and 71A of the NEMBA in GG 40166, GN 864 on 29 July 2016.

As noted in the Terrestrial Biodiversity and Species Scoping Level Assessment (Chapter 7 of this EIA Report), *Prosopis* spp., planted Eucalyptus, and *Opuntia* species are present. In some areas, *Opuntia* has spread into the grassland.

4.2.1.7 The National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (Act 25 of 1999) (NHRA) introduces an integrated and interactive system for the management of national heritage, archaeological and palaeontological resources (which include landscapes and natural features of cultural significance).

Parts of sections 35(4), 36(3) (a) and 38(1) of the NHRA apply to the proposed project:

Archaeology, palaeontology and meteorites:

Section 35 (4) – No person may, without a permit issued by the responsible heritage resources authority:

- a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- c) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

Burial grounds and graves:

Section 36 (3) (a) - No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority:

- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

- b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

Heritage resources management:

38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as:

- a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of the site –
 - (i) exceeding 5 000 m² in extent, or
 - (ii) involving three or more erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
- d) the re-zoning of a site exceeding 10 000 m² in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value. Section 38 (2a) of the NHRA states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted.

A Heritage Impact Assessment (Archaeology and Cultural Heritage) has been commissioned and included in Chapter 11 of this EIA Report. The assessment includes an investigation of potential impacts on archaeology and cultural heritage, as well as a site sensitivity verification. The Screening Tool indicates that the study area (i.e., preferred site) is low sensitivity in terms of the archaeological and cultural heritage theme. The site visit undertaken by the Heritage Specialist indicated that much of the study area is indeed of low sensitivity, but several pockets of higher sensitivity were found to occur. These are places where archaeological and other heritage resources were found and tended to be near farmsteads or dolerite outcrops. These areas are of variably medium to very high sensitivity. Additional detail is provided in Chapters 3 and 11 of this EIA Report.

In terms of Palaeontology, a Site Sensitivity Verification Report (in terms of Part A of GN 320) was compiled during the Scoping Phase, as included in Chapter 12 of this EIA Report. Based on a site visit and several previous field-based and desktop Palaeontology Impact Assessment studies undertaken by the specialist in the De Aar region, it is concluded that the study area is, in practice,

of Low to Very Low palaeo-sensitivity in general. Provided that the recommended Chance Fossil Finds Protocol is incorporated into the Environmental Management Programme (EMPr) and fully implemented during the construction phase of the proposed project, there are no objections on palaeontological heritage grounds to authorisation of the proposed Solar PV Facility and associated infrastructure. Pending the discovery of significant new fossil finds before or during construction, the specialist has thus confirmed that **no further specialist palaeontological studies, monitoring or mitigation are recommended for the Kudu Solar PV Facilities and Electricity Grid Infrastructure (EGI) projects**. Refer to Chapter 12 for additional information.

Ngwao-Boswa Ya Kapa Bokone (Heritage Northern Cape) and the SAHRA are required to provide comment on the proposed project. To this end and to facilitate comment from the relevant heritage authorities, the Background Information Document (BID) was loaded onto the South African Heritage Resources Information System (SAHRIS) during the Project Initiation Phase. A single case (Case Number 18899) was created for all 12 Solar PV and 14 EGI proposed projects and the necessary project information was uploaded to the SAHRIS. Comments were provided by SAHRA (dated 28 July 2022) in response to the review of the BID (as part of the Project Initiation Phase). For continuity, the Scoping Phase PPP documentation are included in Appendix F of this EIA Report.

The DSR was also uploaded onto SAHRIS for each proposed project during the 30-day review period. SAHRA provided an interim comment for each proposed project, and assigned Case Numbers (i.e., SAHRIS Case ID 20336 – 20347). Refer to copies of the comments received from SAHRA during the 30-day review of the DSR, as well as the Scoping Phase Comments and Responses Trail in Appendix F. The recommendations provided by SAHRA for the HIA and Palaeontology Site Sensitivity Report have been addressed during the EIA Phase.

The HIA and Palaeontology Site Sensitivity Verification Report, along with relevant chapters of the Draft EIA Report were uploaded to SAHRIS during the 30-day review period on the Draft EIA Report. Comments received from SAHRA during the EIA Phase are included in Appendix H.6 of this EIA Report, and such comments are captured and responded to in the Comments and Responses Trail in Appendix H.7.

The proposed project may require a permit in terms of the NHRA prior to any fossils or artefacts being removed by professional palaeontologists and archaeologists. If archaeological mitigation is needed, then the appointed archaeologist will need to contact SAHRA and/or the Heritage Northern Cape in order to confirm requirements to conduct the work. The permit application must be carried out well in advance of construction to ensure that there is enough time for the authorities to approve the mitigation work before construction commences. Should professional palaeontological mitigation be necessary during the construction phase, the palaeontologist concerned will need to apply for a Fossil Collection Permit. Palaeontological collection should comply with international best practice. All fossil material collected must be deposited, together with key collection data, in an approved depository (museum / university). Palaeontological mitigation work including the ensuing Fossil Collection reports should comply with the minimum standards specified by SAHRA (2013).

4.2.1.8 National Forests Act (Act 84 of 1998)

The National Forests Act (Act 84 of 1998, as amended) (NFA) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. The most recent list of protected tree species was published in 2018 in GN 536. In terms of Section 15(1) of the NFA, no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. The DFFE is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. Therefore, the removal of any protected tree species listed within the NFA will require a tree removal permit, which can be obtained from the DFFE.

As noted in the Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report), *Boscia albitrunca* is a protected tree in terms of the NFA and was found within the larger study area. Where the proposed project impacts on these species, a permit for the removal of *Boscia albitrunca* from the DFFE will be required during the pre-construction phase, should EA be granted. This has also been commented on by the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR) during the 30-day review of the DSR.

In addition, protection of natural forests through gazetted lists of Natural Forests in terms of Sections 7 (2) of the NFA must also be highlighted. In terms of section 7(1) of the NFA, no person may cut, disturb, damage or destroy any indigenous tree in, or remove or receive any such tree from a natural forest except in terms of (a) a license issued under subsection (4) or section 23 of the NFA; or (b) an exemption from the provisions of subsection (4) of the NFA published by the Minister in the Gazette.

4.2.1.9 Conservation of Agricultural Resources Act (Act 43 of 1983)

The objectives of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- maintenance of the production potential of land;
- combating and prevention of erosion and weakening or destruction of the water sources; and
- protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled,
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled, and
- Category 3 plants may no longer be planted, and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or landowner to control invasive alien plants occurring on the land under their control.

Invasive alien species likely to occur on site are listed above and in the Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report). These alien plant species will be managed in line with the EMPr (Appendix I and Appendix J of this EIA Report).

As noted in the Agriculture Compliance Statement (Chapter 6 of this EIA Report), rehabilitation after disturbance to agricultural land is managed by the CARA. A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as “any act by means of which the topsoil is disturbed mechanically”. The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of a renewable energy facility and its associated infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by the National Department of Agriculture, Land Reform and Rural Development (DALRRD). The construction and operation of the proposed Solar PV Facility will therefore not require consent from the DALRRD in terms of this provision of CARA.

4.2.1.10 Subdivision of Agricultural Land Act (Act 70 of 1970)

As noted in the Agriculture Compliance Statement, two approvals from the DALRRD are required if a proposed renewable energy facility is located on agriculturally zoned land.

The first approval is a No Objection Letter for the change in land use issued by the Deputy Director General (Agricultural Production, Health and Food Safety, Natural Resources and Disaster Management). This letter is one of the requirements for receiving municipal rezoning. It is advisable to apply for this as early in the process as possible. A positive EA does not assure DALRRD’s approval of this. This application requires a motivation backed by good evidence that the development will not significantly compromise the future agricultural production potential of the development site, and the Agriculture Compliance Statement will suffice in this regard. Such an application will be submitted for the proposed Kudu Solar Facility by the Project Developer.

The second required approval is a consent for long-term lease in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). If the DALRRD approval for the proposed project has already been obtained in the form of the No Objection Letter, then SALA approval should not present any difficulties. Note that SALA approval is not required if the lease is over the entire farm portion. In the case of the proposed Kudu Solar Facility, only portions of the farm portion would be leased. SALA approval can only be applied for once the Municipal Rezoning Certificate and EA is in hand. This will be dealt with by the Project Developer, post EA (should it be granted).

4.2.1.11 National Water Act (Act 36 of 1998)

One of the important objectives of the National Water Act (Act 36 of 1998) (NWA) is to ensure the protection of the aquatic ecosystems of South Africa’s water resources. Section 21 of this Act identifies certain land uses, infrastructural developments, water supply/demand and waste disposal as ‘water uses’ that require authorisation (licensing) by the Department of Water and Sanitation (DWS). Chapter 4 (Part 1) of the NWA sets out general principles for the regulation of water use. Water use is defined broadly in the NWA, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering the bed, banks, course or characteristics of a watercourse, removing water found underground for certain purposes, and recreation. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a General Authorisation (GA), or if a responsible authority waives the need for

a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas.

All water users who are using water for agriculture: aquaculture, agriculture: irrigation, agriculture: watering livestock, industrial, mining, power generation, recreation, urban and water supply service must register their water use. This covers the use of surface- and groundwater.

Section 21 of the NWA lists the following water uses that need to be licensed:

- a) taking water from a water resource;
- b) storing water;
- c) impeding or diverting the flow of water in a watercourse;
- d) engaging in a stream flow reduction activity contemplated in section 36;
- e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- g) disposing of waste in a manner which may detrimentally impact on a water resource;
- h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- i) altering the bed, banks, course or characteristics of a watercourse;
- j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) using water for recreational purposes.

Any activities that take place within the outer edge of the 1 in 100 year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; within a watercourse; within 100 m of the edge of a watercourse; or within 500 m of a delineated wetland boundary, will require a water use authorisation in terms of Section 21 (c) and Section 21 (i) of the NWA. An application for water use authorisation for the proposed project will be required should any of the planned structures or infrastructure associated with the proposed project trigger water uses in terms of Section 21 (c) and Section 21 (i) of the NWA.

The GA for Section 21 (c) and (i) water uses as defined under the NWA were revised in 2016 (GN R509). Determining if a Water Use Licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a GA.

According to the Aquatic Biodiversity Assessment (Chapter 8 of this EIA Report), the risk of the proposed project altering the ecological integrity of the adjacent aquatic ecosystems, if mitigated as recommended, is likely to be low such that the associated water use activities in terms of Section 21 (c) and (i) of the NWA would fall within the ambit of the GA. Based on the risk matrix assessment undertaken to inform the Section 21 (c) and (i) water use authorisation process for the proposed project and associated infrastructure, the associated risk to the aquatic features for the proposed project would be low.

The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources. The study area is located mainly within quaternary catchment D33B with small sections within quaternary catchment D62F. Both of these quaternary catchments form part of the Lower Orange Water Management Area in the Northern Cape. The groundwater GA for both of the catchments is 45 m³/ha/a (published on 2 September 2016, in GG 40243, GN 538 (i.e., Revision of GA for the taking and storing of water)). If groundwater will be used for the proposed project, and if more than this is required for the proposed project, or to source all the water from a single property, then an integrated Water Use Licence Application would be required. However, if the proposed project is planned appropriately with regards to groundwater use, all the water can be obtained from groundwater, with the use being Generally Authorised. Registration of the usage in terms of the GA with the DWS would be required.

Should groundwater be used as a water source for the proposed project, then water pipelines may need to be constructed to transfer groundwater from existing boreholes or they may be transported by trucks from the boreholes to the site. Such pipelines will fall below the relevant thresholds in terms of capacity and diameter as specified in the Listed Activities of the 2014 NEMA EIA Regulations (as amended). In addition, groundwater may also need to be stored on site in suitable containers or reservoir tanks during the construction and operational phases. Such storage may trigger the need for a Water Use Authorisation. According to the Revision of GA for the taking of and storing of water published in terms of the NWA, a total of 2000 m³/a can be stored on each property in an open container under the regional GA as long as it is not in a water course. If this is exceeded, then a Water Use Licence would be needed. Therefore, for the proposed project, it is proposed that a total of 2000 m³/a will be stored at the facility on the affected property in an open container.

In addition, the disposal of sewage from the developed site is likely to be stored in conservancy tanks for removal and treatment at the nearby wastewater treatment works of the local authority. This low volume would be within the GA for Section 21 (g) water use activities.

In terms of GAs or Water Use Licences needed for the proposed project, these will be undertaken post EA (should such authorisation be granted), as there are various factors to consider, such as confirmation of the selected water source in terms of the various options available; and the fact that the proposed projects still need to be subjected to the competitive REIPPPP. Note that precedent has been set in the sense that EAs for renewable energy projects have been granted positively and are not contingent on the application for Water Use Licence or GA. Nevertheless, the relevant applications will be made by the Applicant post EA once relevant investigations have been completed.

The DWS has provided comment on the Draft EIA Report. Such comments are included in Appendix H.6 of this EIA Report; and captured and responded to in the Comments and Responses Trail in Appendix H.7 of this EIA Report.

4.2.1.12 Water Services Act (Act 108 of 1997)

Water will be required during the construction, operational and decommissioning phases of the proposed project. Potable water is only to be utilised for human consumption purposes, whereas greywater is to be used for earthworks, dust suppression, etc. Water will be sourced from the following potential sources (in the order of likelihood): Renosterberg Local Municipality; third-party water supplier; existing boreholes or drilled boreholes on site. Should the latter be selected for

water use, the boreholes will be subjected to complete geohydrological testing and an assessment, as well as a Water Use Licence Application process. This will be undertaken as a separate process, once more detailed information becomes available, outside of these current EA Application for the proposed project. Compliance with the Water Services Act (Act 108 of 1997) will be undertaken during the relevant phase of the proposed project, in consultation with the local and district municipalities.

4.2.1.13 Hazardous Substances Act (Act 15 of 1973)

During the proposed project, fuel and diesel will be utilised to power vehicles, generators and equipment. In addition, potential spills of hazardous materials could occur during the relevant phases. Such management actions have been recommended in the EMP, which is included in Appendix I and J of this EIA Report.

4.2.1.14 National Environmental Management: Waste Act (Act 59 of 2008, as amended) (NEM:WA)

The National Environmental Management: Waste Act (Act 59 of 2008, as amended) (NEM:WA) was published with one of the main objectives to reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. Section 19 of the NEM:WA allows the Minister to publish a List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment published. Such a list specifies the waste management activities that will require a Waste Management Licence.

The List of Waste Management Activities was originally published in GN 921 on 29 November 2013, and thereafter amended in GN 332 on 2 May 2014; GN 633 on 24 July 2015; GN 1094 on 11 October 2017; and GN 1757 on 11 February 2022. The List of Waste Management Activities include Categories A, B and C. If any waste management activities listed in Category A are triggered by a development, a BA process must be undertaken in terms of the 2014 NEMA EIA Regulations (as amended), as part of the Waste Management Licence application. Waste management activities in Category B will, however, require a full Scoping and EIA Process in terms of the 2014 NEMA EIA Regulations (as amended), as part of the Waste Management Licence application. If any of the waste management activities in Category C are triggered, then the relevant Norms and Standards must be followed.

Based on a review of the project description, the proposed project (and all projects that form part of the Kudu Solar Facilities and EGI Projects) will **not** trigger the need for a Waste Management Licence. However, general and hazardous waste will be generated during the construction, operational and decommissioning phases, which will require proper management. Such management actions have been recommended in the EMP, which is included in Appendix I and J of this EIA Report.

4.2.1.15 National Environmental Management: Air Quality Act (Act 39 of 2004)

The National Environmental Management: Air Quality Act (Act 39 of 2004, as amended) (NEM: AQA) was published in 2004 and came into full effect on 31 March 2010, when the Atmospheric Pollution Prevention Act (Act 45 of 1965) (APPA) was repealed. The NEM: AQA was published with the overall objective to:

- *“reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development;*
- *provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto”.*

The list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage was published under GN 248, GG 33064 dated 31 March 2010 and thereafter amended in GN 893, GG 37054 dated 22 November 2013. The list of activities was further amended in GN 551, GG 38863 dated 12 June 2015; GN 1207, GG 42013 dated 31 October 2018; GN 687, GG 42472 dated 22 May 2019; and GN 421, GG 43174 dated 27 March 2020.

Section 22 of the NEM: AQA deals with the consequences of listing, and it states that “no person may without a provisional atmospheric emission licence, or an atmospheric emission licence conduct an activity (a) listed on the national list anywhere in the Republic; or (b) listed on the list applicable in a province anywhere in that province”. Therefore, a Provisional Atmospheric Emissions Licence (AEL) and/or AEL is required for any plant or proposed development that triggers a listed activity.

Based on a review of the project description, the proposed project (and all projects that form part of the Kudu Solar Facilities and EGI Projects) will **not** trigger the need for an AEL. However, the proposed stockpiling activities, including earthworks, may result in the unsettling of, and temporary exposure to, dust. Appropriate dust control methods will need to be applied. Such management actions have been recommended in the EMPr, which is included in Appendix I and J of this EIA Report.

4.2.1.16 Astronomy Geographic Advantage (Act 21 of 2007)

The Astronomy Geographic Advantage (AGA) Act (Act 21 of 2007) aims to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and to provide for matters connected therewith. The purpose of the AGA Act is to preserve the geographic advantage areas that attract investment in astronomy. The AGA Act also notes that declared astronomy advantage areas are to be protected and properly maintained in terms of Radio Frequency Interference (RFI). The AGA Act is administered by the Department of Higher Education, Science and Technology (previously the Department of Science and Technology).

According to the CSIR Wind and Solar Phase 2 SEA (Department of Environment, Forestry and Fisheries (DEFF), 2019: Part 3, Page 2⁴), the majority of the mid-frequency dish array of the Square Kilometre Array (SKA) will be constructed in the core which is located in the Northern

⁴ Department of Environment, Forestry and Fisheries (DEFF), 2019. Phase 2 Strategic Environmental Assessment for wind and solar PV energy in South Africa. CSIR Report Number: CSIR/SPLA/SECO/ER/2019/0085 Stellenbosch, Western Cape.

Cape; with dish antennas being located in the spiral arms. The South African component of the SKA will consist of approximately 3 000 receptors comprising dish antennas, each with a diameter of 15 m, and radio receptors known as dense aperture-arrays. The outer stations in the spiral arms will extend beyond the borders of South Africa and at least 3 000 km from the core area. About 80% of the receptors, including a dense core and up to 5 spiral arms, will be located in the Karoo Central Astronomy Advantage Area (KCAAA) (DEFF, 2019²: Part 3, Page 2).

The KCAAA, which is located between Brandvlei, Van Wyksvlei, Carnarvon and Williston in the Northern Cape Province, was officially declared in 2014 by the Minister of Science and Technology in terms of the AGA Act for the purposes of protection RFI and Electromagnetic Interference (EMI). The declaration of the KCAAA ensures the long-term viability of the area to be used for astronomical installations (DEFF, 2019²: Part 3, Page 2).

PV installations are known to have unintentional radiated emissions from electrical and electronic equipment that have the potential to interfere with the SKA Radio Telescope project in the Northern Cape. This can result in interference to celestial observations and/or data loss. Such interference is typically referred to as RFI (DEFF, 2019²: Part 3, Page 2).

The proposed project study area is not located within the KCAAA, and therefore not expected to have any significant impacts on the SKA. Refer to the locality map provided in Chapter 1 of this EIA Report for additional information in this regard.

The South African Radio Astronomy Observatory (SARAO) / SKA Office have been pre-identified as a key stakeholder and therefore included on the project database of I&APs (as shown in Appendix E of this EIA Report). As such, the SKA office was provided with a copy of the BID and Letter 1 during the Project Initiation Phase; as well as a notification of the release of the DSR for a 30-day comment period (i.e., Letter 2) during the Scoping Phase; and a notification for the release of the Draft EIA Report for a 30-day comment period (i.e., Letter 5). The developer has also communicated with the SARAO. SARAO provided a letter confirming that they have undertaken a high-level impact assessment based on the information provided for the proposed projects, and it was determined that the proposed projects represent a **low risk of interference to the nearest SKA radio telescope with a compliance surplus of 279.92 dBm/Hz**. As such, the SARAO does not have any objection to the proposed development. Refer to Appendix K of the EIA Report for a copy of this correspondence from the SARAO.

4.2.1.17 Development Facilitation Act (Act 67 of 1995)

The Development Facilitation Act (Act 67 of 1995) (DFA) sets out a number of key planning principles which have a bearing on assessing proposed developments in light of the national planning requirements. The planning principles most applicable to the study area include:

- Promoting the integration of the social, economic, institutional and physical aspects of land development;
- Promoting integrated land development in rural and urban areas in support of each other;
- Promoting the availability of residential and employment opportunities in close proximity to or integrated with each other;
- Optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;

- Contributing to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs;
- Promoting the establishment of viable communities; and
- Promoting sustained protection of the environment.

4.2.1.18 Other Applicable Legislation

Other applicable national legislation that may apply to the proposed project include:

- Advertising on Roads and Ribbons Act (Act 21 of 1940);
- Electricity Act (Act 41 of 1987);
- Electricity Regulations Amendments (August 2009);
- Promotion of Administrative Justice Act (Act 2 of 2000);
- Civil Aviation Act (Act 13 of 2009) and Civil Aviation Regulations (CAR) of 1997;
- Civil Aviation Authority Act (Act 40 of 1998);
- White Paper on Renewable Energy (2003);
- Integrated Resource Plan for South Africa (2019);
- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993)⁵;
- Road Safety Act (Act 93 of 1996);
- Fencing Act (Act 31 of 1963);
- National Environmental Management: Protected Areas Act (NEM:PA) (Act 57 of 2003); and
- National Road Traffic Act (Act 93 of 1996).

4.2.2 Provincial Legislation

4.2.2.1 Northern Cape Nature Conservation Act (Act 9 of 2009)

The Northern Cape Nature Conservation Act (Act 9 of 2009) (NCNCA) has reference to the proposed project. This Act aims at improving the sustainability in terms of balancing natural resource usage and protection or conservation thereof. It includes six schedules, as follows:

- Schedule 1 - Specially Protected species;
- Schedule 2 - Protected species;
- Schedule 3 - Common indigenous species;
- Schedule 4 - Damage causing animal species;
- Schedule 5 - Pet species; and
- Schedule 6 - Invasive Species.

With regards to protected flora, the NCNCA includes a list of protected flora.

Based on the Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report), no SCC were recorded, and some Provincially Protected species were found. These Provincially Protected species are protected in terms of the NCNCA. Relocation permits will be required from the Northern Cape DAEARDLR under the NCNCA, should the final development footprint of the

⁵ The proposed Battery Energy Storage Systems (BESS) must be designed, operated, maintained and decommissioned according to the requirements of Occupational Health and Safety Act (Act 85 of 1993).

proposed project necessitate the removal or relocation of these species. Refer to the Terrestrial Biodiversity and Species Assessment for additional information.

The Terrestrial Biodiversity and Species Scoping Level Assessment also noted that according to the Screening Tool, habitat in the study area could support *Tridentea virescens*, but no individuals were found during the site sensitivity verification survey. The species is listed as Rare as it is highly habitat specific and/or have small numbers of individuals, all of which makes it vulnerable to extinction should it lose habitat. The species is extremely small and grows underneath shrubs (especially *Rhigozum trichotomum* which is dominant on the study area), making it difficult to observe. Furthermore, the grass layer was tall and dense during the site sensitivity verification survey (which was a first for the area in over 10 years due to good rains), which made the visibility of the species more difficult. It accordingly has a moderate likelihood of occurring. Since it is not a highly threatened species (and a succulent), relocation could be considered as a viable option should it be found. The optimal time to search for it is between February to March when the species is in flower. It is therefore suggested that the species form part of the search and rescue procedure during the appropriate flowering period, and if recorded to apply for a permit application with the provincial authority for relocation.

Therefore, it has been recommended as part of the EMP, that a detailed plant search and rescue operation be conducted before the final design process, during the appropriate flowering period where needed, and prior to the commencement of the construction phase. If any of the listed species are found, the relevant permits should be obtained by the Project Applicant prior to their relocation or destruction.

The Northern Cape DAEARDLR, serving as the provincial authority for issuing of the relevant permits, has been pre-identified as a key stakeholder and is included on the project database (as shown in Appendix E of this EIA Report). Efforts have been made to ensure that the Northern Cape DAEARDLR is aware of the progress of the Scoping and EIA Processes. The Department also provided comments on the DSR, and these comments are included in the Scoping Phase PPP (Appendix F of this report). Follow up correspondence was sent to the Northern Cape DAEARDLR during the 30-day comment period on the Draft EIA Report, in order to seek comments. Such correspondence is included in Appendix H.4 of this EIA Report. Telephonic discussions were also held with the Northern Cape DAEARDLR to seek clarification on the applicability of the listed activities in Listing Notice 3. Clarification from the Northern Cape DAEARDLR was sent via email, as included in Appendix H.6 of this EIA Report,

4.2.2.2 Northern Cape Strategic Plan 2020-2025

The vision of the Strategic Plan is a modern, growing, and successful Northern Cape. In addition, the main aim of the Plan is to govern the Northern Cape Province towards alleviating the triple challenges (e.g., unemployment, inequality, and poverty) and towards a people centred Public Service.

The Northern Cape Strategic Plan 2020 stated that the province is one of the best sites in the world to produce solar renewable energy and that this potential has attracted a large number of investors to the province. However, the Plan also stated that the province also experiences inequality, unemployment, and poverty.

The proposed project aligns itself with the aim of this Strategic Plan in that it will provide employment opportunities as well as a required source of energy to the national grid. Employment creation would mainly be temporary in nature during the construction phase with limited opportunities created during the operational phases. Refer to Chapter 2 of this EIA Report for additional information on the proposed employment opportunities.

4.2.2.3 Northern Cape Provincial Spatial Development Framework (2018)

The focus areas on the Northern Cape Provincial Spatial Development Framework (SDF) include urban and rural development; enhancing regional connectivity; promoting infrastructure investment; and protecting local resources. In addition, the SDF stresses the need to address spatial inefficiencies and inequalities, identify areas of opportunity and ensure proactive management of natural resources and ecosystems in the Northern Cape. The SDF also outlines that sustainability is central to provincial economic policies, as well as to its social development agenda. The proposed project is in line with the focus areas of the Northern Cape SDF. It will uplift the local communities through employment creation and increased investment in infrastructure. In addition, the proposed development will provide a sustainable source of energy for the national grid.

4.2.3 District and Local Planning Legislation

4.2.3.1 Environmental Management Framework

Research indicates that there is no Environmental Management Framework (EMF) for the Pixley Ka Seme District Municipality (PKSDM). The Screening Tool also notes that no intersections with EMF areas have been found.

4.2.3.2 PKSDM Integrated Development Plan (IDP)

The strategic objectives of the PKSDM Integrated Development Plan (IDP) 2022 - 2027 are (PKSDM, 2022⁶, Page 99):

- “To enhance compliance with the tenets of good governance as prescribed by legislation and best practice;
- To administer finances in a sustainable manner and strive to comply with legislative requirements to achieve a clean audit outcome;
- To monitor and support local municipalities to enhance service delivery;
- To promote economic growth in the district;
- To guide local municipalities in the development of their IDP’s and in spatial development;
- To provide a professional, people-centred human resources and administrative service to citizens, staff and Council;
- To provide an independent and objective internal audit assurance and consulting service to add value and to improve the administrative operations of all the municipalities in the district through an approach that is systematic and disciplined;
- To provide disaster management services to the citizens; and
- To provide municipal health services to improve the quality of life of the citizens.”

⁶ Pixley Ka Seme District Final Integrated Development Plan (IDP) 2022 – 2027. 2022. Available: [https://www.pksgdm.gov.za/idps/PKSDM%20Final%20Integrated%20Development%20Plan%20\(IDP\)%202022-2027.pdf](https://www.pksgdm.gov.za/idps/PKSDM%20Final%20Integrated%20Development%20Plan%20(IDP)%202022-2027.pdf). [online] Accessed: November 2022.

The IDP (PKSDM, 2022⁴) emphasises that there is great opportunity for renewable energy development in the PKSDM, since there is a vision of placing the PKSDM as the leading innovative region and global centre for renewable energy. Specifically, the IDP highlights that the Renosterberg Local Municipality, in which the proposed project will be located, recognises solar energy as an opportunity and aspires to harness solar energy as an alternative that can be directly sold to the community, thereby accentuating the renewable energy sector as a strategic economic sector (PKSDM, 2022⁴).

The proposed project is in line with the PKSDM IDP because it will enable the PKSDM to achieve environmental sustainability and to build resilience (PKSDM, 2022⁴). Furthermore, the IDP states that the district has favourable conditions for solar energy development which is a significant positive factor for the proposed project. Furthermore, the proposed project is aligned with one of the objectives of the IDP in that it will encourage local economic growth through increased investment and employment opportunities. The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if EA is granted by the DFFE).

4.2.3.3 Guidelines, Frameworks and Protocols

The following guidelines, frameworks and protocols are applicable to the proposed project:

- Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - Guideline on Alternatives (DEA, 2014);
 - Guideline on Transitional Arrangements (Department of Environmental Affairs and Development Planning (DEA&DP), 2013);
 - Guideline on Alternatives (DEA&DP, 2013);
 - Guideline on Public Participation (DEA, 2012; DEA&DP, 2013; DEA, 2017);
 - National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008;
 - Guideline on Need and Desirability (DEA&DP, 2013; DEA, 2017);
- Information Document on Generic Terms of Reference for Environmental Assessment Practitioners (EAPs) and Project Schedules (March 2013);
- Integrated Environmental Management Information Series (Booklets 0 to 23) (Department of Environmental Affairs and Tourism (DEAT), 2002 – 2005);
- Guidelines for Involving Specialists in the EIA Processes Series (DEA&DP; CSIR and Tony Barbour, 2005 – 2007);
- BirdLife South Africa (BLSA) 2017 Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa;
- Species Environmental Assessment 2020 Guideline: Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for EIAs in South Africa. South African National Biodiversity Institute (SANBI);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

4.2.4 International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed project will as far as practicable incorporate the environmental and social policies of the International Finance Corporation (IFC). These policies provide a frame of reference for lending institutions to review environmental and social risks of projects, particularly those undertaken in developing countries.

Through the Equator Principles, the IFC's standards are now recognised as international best practice in project finance. The IFC screening process categorises projects into A, B or C in order to indicate relative degrees of environmental and social risk. The categories are:

- *Category A* - Projects expected to have significant adverse social and/or environmental impacts that are diverse, irreversible, or unprecedented;
- *Category B* - Projects expected to have limited adverse social and/or environmental impacts that can be readily addressed through mitigation measures; and
- *Category C* - Projects expected to have minimal or no adverse impacts, including certain financial intermediary projects.

Accordingly, projects such as the proposed Kudu Solar Facility are categorised as Category B projects. The EIA Process for Category B projects examines the project's potential negative and positive environmental impacts. As required for Category B projects, a Scoping and EIA Process was commissioned.

Other Acts, standards and/or guidelines are reviewed in more detail as part of the specialist studies that have been conducted in the EIA Phase.

4.3 Legal Context for this EIA

In terms of the NEMA and the 2014 NEMA EIA Regulations (as amended), a full Scoping and EIA Process is required for the proposed project. The need for the full Scoping and EIA Process is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- ***“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure”.***

Note that the proposed project is not located within any of the 11 Renewable Energy Development Zones (REDZs) gazetted in GN 114 on 16 February 2018 and GN 144 on 26 February 2021. However, the proposed EGI projects (which will be subjected to separate BA and/or Standard Registration processes⁷) are located within the Central Strategic Transmission Corridor that was gazetted in GN 113 on 16 February 2018.

⁷ The registration processes are based on the Standard for the Development and Expansion of Power Lines and Substations within identified Geographical Areas and the Exclusion of this Infrastructure from the Requirement to obtain an Environmental Authorisation, published in Government Gazette 47095, GN 2313, published on 27 July 2022.

Therefore, a full Scoping and EIA Process is being undertaken for the proposed Kudu Solar Facility, subjected to a 107-day decision-making timeframe.

All the listed activities forming part of this proposed development and therefore requiring EA were included in the Application Form for EA that was prepared and submitted to the DFFE with the DSR. However, during the 30-day review period on the DSR, various comments were raised by the DFFE Chief Directorate: Integrated Environmental Authorisations on the applicability of certain listed activities, and specifications of the project description and how they relate to the applicable listed activities. Based on these comments, the applicability of certain listed activities was updated and as such an Amended Application Form for EA was submitted with the FSR. A summary is provided below describing the main updates made at the end of the Scoping Phase:

- **Activity 11 of Listing Notice 1:** The Independent Power Producer (IPP) Substation is required to facilitate the connection of the proposed Kudu Solar Facility to the national grid. The applicability of this listed activity was to be confirmed with the DFFE i.e. to clarify if the IPP Substation can be included in this EIA or whether a separate process is required under the EGI Standard (similar to Projects 13 to 26). Based on the feedback received (as captured in Appendix F.10 and F.11 of this EIA Report), this listed activity will be retained in the current application for the proposed project (i.e., the PV and associated infrastructure application). Therefore, the IPP Substation will not be subjected to a separate registration process in terms of the EGI Standard.
- **Activity 14 of Listing Notice 1:** More clarity was provided around the proposed Redox Flow BESS. This listed activity is not applicable to the Lithium-Ion BESS.
- **Listing Notice 3 Listed Activities:** The DFFE requested that written confirmation must be obtained from the relevant authority (i.e., Northern Cape DAEARDLR) to confirm if there is an adopted bioregional plan or systematic biodiversity plan in relation to Critical Biodiversity Areas (CBAs). **As noted in Appendix F.10 of this EIA Report, the Northern Cape DAEARDLR confirmed that the Northern Cape CBA Map is adopted by the Department as a systematic biodiversity plan, and that the Northern Cape does not have any bioregional plans.**
- **Overall certainty needed on the applicability of the listed activities:** The applicability of the listed activities has been updated, where possible, to ensure that it is more specific and to describe how the listed activities applied for are linked to the project description.

However, at the Scoping Phase there were some project aspects that still needed to be confirmed during the EIA Phase, and it was necessary to follow the maximum development scenario or precautionary approach at the time. In this regard, concerted efforts have been made to confirm the applicability of the listed activities during the EIA Phase, and an Amended Application for EA was submitted accordingly with the Draft EIA Report. As part of the acceptance of the FSR (Appendix G of this EIA Report), the DFFE did request for clarification on certain listed activities, as well as more succinct information presented in the applicability discussion. The following must be taken into consideration:

- **Road Widening and Lengthening Listed Activities:** As noted in the Traffic Impact Assessment, various Access Route Options are available for the proposed project. The existing main roads, divisional roads and unnamed farm gravel roads may need to be upgraded for access to the proposed Kudu Solar cluster, depending on which route is used. The roads leading to the study area are of a sufficient width to accommodate truck movement, however

widening by more than 4 m or more than 6 m may be required at localised positions (i.e. intersections) as required. However, exact specifications of the intersection widening, upgrading and lengthening will require further engineering analysis. Therefore, these listed activities (i.e. Activity 56 of Listing Notice 1; and Activity 18 (g) (ii) (ee) (ii) of Listing Notice 3) have been removed from the current Application for EA, and will be considered through a separate process once more details become available. It is possible to align such with the separate EGI Projects 13 to 26. Information regarding the access routes have been detailed in this EIA Report for background purposes.

- **Listed Activities for the BESS:** The DFFE confirmed that both Solid State Lithium-Ion and Redox Flow BESS cannot be authorised in the EA, should such be granted, and that a preferred technology type must be selected. Refer to Chapter 15 of this EIA Report for a High-Level BESS Risk Assessment, and Chapter 20 of this EIA Report which documents the motivation for the preferred technology for authorisation (i.e. Solid State Lithium-Ion BESS). Therefore, the listed activities have been updated to remove reference to Redox Flow BESS. Note that both technologies are suitable, as discussed in the specialist assessments. Should the need to change the technology arise in future, it is understood that an EA amendment process can be followed as both technologies have been assessed as part of the EIA Phase.

As part of the comments made by the DFFE during the 30-day review of the Draft EIA Report, the DFFE requested for clarification on certain listed activities particularly included in Listing Notice 3. The following must be taken into consideration:

- **Listing Notice 3 Listed Activities:** Activity 4 (g) (ii) (ee) relates to “(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”. Activity 14 (ii) (a) and (c); (g), (ii) (ff) relates to “(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”. Activity 23 (ii) (a) (g) (ii) (ee) relates to “(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans”. However, the entire study area (i.e., preferred site), which contains the Buildable Area and development footprint, falls within an Ecological Support Area (ESA) according to the Northern Cape Critical Biodiversity Area (CBA) Map (2016). DFFE stated in their comment on the Draft EIA Report that the aforementioned listed activities only apply to CBAs and not ESAs, and therefore the applicability of these listed activities must be clarified. This was discussed with the Northern Cape DAEARDLR and they have confirmed that ESAs are not listed under Listing Notice 3 for the Northern Cape (unlike other provinces such as Gauteng), and ESAs have been separately mapped in the 2016 Northern Cape CBA map (which consist of CBA 1, CBA 2, ESAs and Other Natural Areas). Based on this, as well as the comment from the DFFE, the aforementioned listed activities are no longer applicable to the proposed project as it only relates to CBAs. Therefore, these listed activities have been removed from the Application for EA; and an updated amended Application for EA has been submitted to the DFFE with the Final EIA Report. Refer to Appendix H.6 of this EIA Report for the correspondence from the Northern Cape DAEARDLR. It would have been preferred to still include such listed activities in the Application for EA from a precautionary perspective, however based on the comments received from the DFFE thus far regarding the need for certainty, these have been removed. However, the impact on the ESA has still been considered in this EIA Process.

- **Activity 15 of Listing Notice 2:** The DFFE has requested that the indigenous vegetation types be specified in the applicability of the listed activities. This has been included, and an updated amended Application for EA has been submitted to the DFFE with the Final EIA Report.

The updated listed activities triggered by the proposed project are indicated in Table 4.1. All updates have been carried through to the Amended Application for EA which was submitted to the DFFE with the Final EIA Report.

Table 4.1: Listed Activities in GN R327, GN R325, and GN R324 that will be potentially triggered by the proposed project.

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
Listing Notice 1, GN R327		
Activity 11 (i)	<p>The development of facilities or infrastructure for the transmission and distribution of electricity:</p> <p>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;</p> <p>excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —</p> <p>(a) temporarily required to allow for maintenance of existing infrastructure;</p> <p>(b) 2 kilometres or shorter in length;</p> <p>(c) within an existing transmission line servitude; and</p> <p>(d) will be removed within 18 months of the commencement of development.</p>	<p>The proposed project will entail the construction of an on-site substation complex at the Solar PV Facility. The on-site substation complex will include various infrastructure, as well as an On-site Independent Power Producer (IPP) or Facility Substation. This will include the relevant section that will be maintained by the IPP (i.e., the high voltage infrastructure leading up to the Point of Connection (the Project Applicant’s section of the proposed on-site substation complex)). This constitutes facilities for the distribution and transmission of electricity.</p> <p>The on-site substation complex will be up to 8 ha in area and will have a height of up to 10 m, with a capacity stepping up to 132 kV.</p> <p>The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province.</p>
Activity 12 (ii) [(a) and (c)]	<p>The development of:</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs:</p> <p>(a) within a watercourse;</p>	<p>The proposed project will entail the construction of various infrastructure and structures (such as the solar field, on-site substation complex, Battery Energy Storage System (BESS), laydown area, internal roads (i.e. new roads within the fenced off area of the PV Facility, and new roads between the closest existing road and the PV Facility to gain access), and various ancillary infrastructure such as Operation and Maintenance (O&M) building / centre, site office, workshop, staff lockers, bathrooms/ablutions, warehouse, guard house, etc.).</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	<p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding:</p> <p>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of commencement of the development and where indigenous vegetation will not be cleared.</p>	<p>These infrastructure and structures will exceed a footprint of 100 m² and some occur within small drainage features, floodplain areas, and 32 m of the watercourses, as indicated in the sensitivity mapping identified by the aquatic specialist.</p> <p>The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province.</p>
Activity 14	<p>The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</p>	<p>The construction and operational phases of the proposed Solar PV Facility will require dangerous goods such as chemicals, fuels, oils, lubricants and solvents. Therefore, infrastructure for the storage and handling of dangerous goods of more than 80 m³ but not exceeding 500 m³ are proposed at the Solar PV Facility. Dangerous goods will be stored on site within designated areas such as laydown areas, workshops etc.</p>
Activity 19	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil,</p>	<p>The proposed project will entail the excavation, removal and moving of more than 10 m³ of soil, sand, pebbles or rock from nearby watercourses and floodplains. The proposed project will also entail</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	<p>sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <p>a) will occur behind a development setback;</p> <p>b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	<p>the infilling of more than 10 m³ of material into the nearby watercourses and wide floodplains.</p> <p>Specifically, the associated infrastructure traversing watercourses (such as access roads) will result in the accumulated infilling or depositing of more than 10m³ of material into watercourse and wide flood plains.</p>
Activity 28 (ii)	<p>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:</p> <p>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</p> <p>excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	<p>The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province.</p> <p>The land within the study area is currently being used for livestock grazing, with some game animals such as springbok. Therefore, the land earmarked for the development of the proposed Kudu Solar Facility is currently used for agricultural purposes (mainly low intensive livestock farming).</p> <p>The proposed solar PV facility, which is considered a commercial/industrial development, will have a footprint in excess of 1 ha (minimum footprint of about 34 ha). The proposed project will also entail the construction of various infrastructure and structures</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		(such as the solar field, on-site substation complex, BESS, laydown area, internal roads (i.e. new roads within the fenced off area of the PV Facility, and new roads between the closest existing road and the PV Facility to gain access), and various ancillary infrastructure such as O&M building / centre, site office, workshop, staff lockers, bathrooms/ablutions, warehouse, guard house, etc.). This will constitute infrastructure with a physical footprint of more than 1 ha.
Listing Notice 2, GN R325		
Activity 1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs — (a) within an urban area; or (b) on existing infrastructure.	The proposed project is a Solar PV Facility (i.e., facility for the generation of electricity from a renewable resource) with a capacity of up to 50 MWac (more than 20 MWac). The proposed project will take place outside of an urban area. It will be constructed on various affected farm portions, north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province.
Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for: (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed Solar PV Facility will have a footprint in excess of 20 ha (minimum footprint of about 34 ha). As a result, more than 20 ha of indigenous vegetation will be removed for the construction of the proposed Solar PV Facility. According to Mucina & Rutherford (2006, as amended), the proposed project falls within the Northern Upper Karoo vegetation type.

4.4 Screening Tool

As noted above, GN 960 (dated 5 July 2019) stipulates the compulsory requirement (as from 4 October 2019) to submit a report generated by the Screening Tool, when submitting an Application for EA. The proposed project has accordingly been run through the Screening Tool, and the associated report generated and attached to the Application for EA that was submitted at the Scoping Phase. Additional Screening Tool Reports, showing only the development footprint for each project have been run and added to the Amended Application for EA (that was submitted with the Draft EIA Report) and Appendix K of this EIA Report.

Based on the selected classification, the Screening Tool provides a list of specialist assessments that should be undertaken as part of the Scoping and EIA Process, as well as identifies the sensitivities on site that need to be verified by either the EAP or the specialists, where relevant, as noted in the Assessment Protocols of 20 March 2020 (GN 320) and 30 October 2020 (GN 1150). The classification that applies to the proposed project is **Utilities Infrastructure; Electricity; Generation; Renewable; Solar; PV**.

The following list of Specialist Assessments have been identified by the Screening Tool for inclusion in the Scoping and EIA Processes (Table 4.2). **The Screening Tool Report notes that it is the responsibility of the EAP to confirm this list and to motivate in the EIA Report, the reason for not including any of the identified specialist assessments, where relevant.**

As discussed at the Pre-Application Meeting held on 26 April 2022, the DFFE noted that the Screening Tool must be used as a guidance in terms of what studies are required and not required, and that the EAP must confirm this. Hence, the EAP is recommending that certain studies are not required. Refer to the discussion below.

Table 4.2: List of Specialist Assessments identified by the Screening Tool for the proposed project.

Specialist Assessment Required by the Screening Tool	Assessment undertaken in Scoping and EIA Process	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Chapter of EIA Report
1 Agricultural Impact Assessment	Yes	Protocol GN 320: Part B: Agriculture (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Agricultural Resources by Onshore Wind and/or Solar PV Energy Generation Facilities where the Electricity Output is 20 MW or more): Compliance Statement	Chapter 6
2 Landscape/Visual Impact Assessment	Yes	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment	Chapter 10
3 Archaeological and Cultural Heritage Impact Assessment	Yes	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended) and NHRA: Impact Assessment	Chapter 11
4 Palaeontology Impact Assessment	Yes (Site Sensitivity Verification)	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations	Chapter 12

	Specialist Assessment Required by the Screening Tool	Assessment undertaken in Scoping and EIA Process	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Chapter of EIA Report
			(as amended): Motivation for no further requirements and no Impact Assessment	
5	Terrestrial Biodiversity Impact Assessment	Yes	Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity): Impact Assessment Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Chapter 7
6	Aquatic Biodiversity Impact Assessment	Yes	Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Aquatic Biodiversity): Impact Assessment Note there is currently no Species Protocol applicable to Aquatic Plants and Animals.	Chapter 8
7	Civil Aviation Assessment	Yes (Site Sensitivity Verification)	Protocol GN 320: Part B: Civil Aviation (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations): Site Sensitivity Verification or Compliance Statement The Screening Tool indicates that the proposed project area is of "low" sensitivity. This has been verified and confirmed on site. As per the protocols, a Site Sensitivity Verification is only required. The South African Civil Aviation Authority (SACAA) and Air Traffic Navigation Services (ATNS) are included on the Interested and Affected Party (I&AP) database, and were provided with access to the DSR in order to seek comment during the 30-day review period. Proof of correspondence during the Scoping Phase is included in Appendix F of this report. The Draft EIA Report was also provided to the SACAA and ATNS for the 30-day review period. Comment has been received from the SACAA, as included in Appendix H.6 of this EIA Report, and responded to in the Comments and Responses Report in Appendix H.7.	Chapter 18
8	Defence Assessment	Yes (Site Sensitivity Verification)	Protocol GN 320: Part B: Defence (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Defence Installations): Site Sensitivity Verification or Compliance Statement The Screening Tool indicates that the proposed project area is of "low" sensitivity. This has been verified and confirmed on site. As per the protocols, a Site Sensitivity Verification is only required.	Chapter 19

	Specialist Assessment Required by the Screening Tool	Assessment undertaken in Scoping and EIA Process	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Chapter of EIA Report
			<p>The Department of Defence was provided with access to the DSR in order to seek comment during the 30-day review period. Proof of correspondence during the Scoping Phase is included in Appendix F of this report. The Draft EIA Report was also provided to the Department of Defence for the 30-day review period. Feedback has been received from the Department of Defence, as included in Appendix H.6 of this EIA Report, and responded to in the Comments and Responses Report in Appendix H.7.</p>	
9	Radio Frequency Interference (RFI) Assessment	No	<p>Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment</p> <p>The Screening Tool indicates that the proposed project area is of medium and low sensitivity in terms of RFI. The medium sensitivity is based on the study area being located between 30 and 60 km from a Weather Radar installation and within the radar's line of sight. The Developer has communicated with the South African Weather Service (SAWS). SAWS provided a letter that notes that tests conducted by the SAWS indicated that the proposed projects will not have any direct impact on the SAWS radar station located in De Aar. Therefore, SAWS supports the development of the Kudu Solar Facilities at the proposed location. Therefore, this is not a concern from an RFI perspective. Refer to Appendix K of this EIA Report for a copy of this correspondence.</p> <p>Furthermore, the SARA O also confirmed that proposed projects represent a low risk of interference to the nearest SKA radio telescope with a compliance surplus of 279.92 dBm/Hz; and as such, the SARA O does not have any objection to the proposed development. Refer to Appendix K of this EIA Report for a copy of this correspondence.</p> <p>Further to the above, the proposed project is located outside of the KCAAA and thus not expected to impact significantly on the SKA. Therefore, an RFI Assessment was not undertaken during the EIA Phase.</p> <p>Refer to additional information in Section 4.3.2 below.</p>	Not applicable
10	Geotechnical Assessment	Yes	<p>Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment</p> <p>There are no themes on the Screening Tool that currently relate to Geotechnical features that could be verified on site. Hence Part A of GN 320 (Site</p>	Chapter 17

Specialist Assessment Required by the Screening Tool	Assessment undertaken in Scoping and EIA Process	Type of Assessment undertaken in Scoping and EIA Process or Motivation/Feedback for not undertaking the recommended study	Chapter of EIA Report
		Sensitivity Verification) is not applicable in this regard.	
11	Socio-Economic Assessment	Yes Appendix 6 of the 2014 NEMA EIA Regulations (as amended): Impact Assessment There are no themes on the Screening Tool that currently relate to Socio-Economic features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Chapter 13
12	Plant Species Assessment	Yes Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species: Impact Assessment Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Chapter 7
13	Animal Species Assessment	Yes Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species: Compliance Statement Note that the reporting for Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species are combined in one report.	Chapter 7

4.4.1 Additional Specialist Assessments

It must be noted that the Screening Tool did not identify the need for the following specialist assessments, however these studies have been commissioned as part of the Scoping and EIA Process to ensure that all potential impacts resulting from the proposed project are considered as best as possible:

- **Avifauna Impact Assessment:** The Specialist Assessment is included in Chapter 9 of this EIA Report. The Avifauna Impact Assessment has been undertaken in compliance with GN 1150 (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species: Impact Assessment), as well as relevant guidelines.
- **Traffic Impact Assessment:** The Specialist Assessment is included in Chapter 14 of this EIA Report. The Traffic Impact Assessment has been undertaken in compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended).
- **BESS High Level Safety, Health and Environment Risk Assessment:** The detailed study is included in Chapter 15 of this EIA Report. This is a technical report and does not need to fulfil the requirements of the 2014 NEMA EIA Regulations (as amended).

- **Geohydrology Impact Assessment:** The Specialist Assessment is included in Chapter 16 of this EIA Report. The Geohydrology Impact Assessment has been undertaken in compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended).

4.4.2 RFI Assessment

The Screening Tool identified the need for an RFI Assessment. However, an RFI Assessment has not been undertaken as part of the Scoping and EIA Process because the proposed project does not fall within the KCAAA region, and thus not expected to have a significant impact on the SKA. Refer to the locality map provided in Chapter 1 of this EIA Report for additional information.

The SARAO confirmed that the proposed projects represent a low risk of interference to the nearest SKA radio telescope and that the SARAO does not have any objection to the proposed development. Refer to Appendix K of this EIA Report for a copy of this correspondence.

The RFI Theme on the Screening Tool indicates medium and low sensitivity due to the proposed project being located between 30 and 60 km from a Weather Radar installation and within the radar's line of sight. Research indicates that this is the De Aar Weather Office. The CSIR Wind and Solar Phase 2 SEA (DEFF, 2019²: Part 3.13, Page 2) notes that solar PV development generally does not have an impact on weather surveillance radar, however wind turbines are known to influence such systems. The SEA Report notes that there are no specific assessment requirements for impacts on weather radar systems, and that the South African Weather Services (SAWS) should be consulted for comment where a proposed development is in an area which may impact weather radars. In addition, the SEA explains that in medium sensitivity areas there is a low potential for negative impacts, there is a high likelihood of mitigation in the event of impacts, and further assessment of the potential impacts may not be required. The SAWS did provide comment on the proposed projects and confirmed that tests conducted by the SAWS indicated that the proposed projects will not have any direct impact on the SAWS radar station located in De Aar; and that the SAWS supports the development of the Kudu Solar Facilities at the proposed location.

In addition, photographs of the site are included in the Civil Aviation and Defence Site Sensitivity Verifications (Chapters 18 and 19 of this EIA Report, respectively). These can be referred to for a general overview of the site.

Based on this, the EAP is of the opinion that an RFI Assessment is not warranted.

This motivation for exclusion was acknowledged by the DFFE during the pre-application meeting, with the recommendation for such motivation to be included in the Scoping and EIA Reports. No objections to this approach were raised by the DFFE during the Scoping Phase. All correspondence relating to the pre-application meeting is addressed in Appendix D of this EIA Report.

4.5 Overview of Approach to Preparing the EIA Report and EMPr

Separate EIA Reports have been compiled for each of the 12 Kudu Solar Facilities. The EIA Report was released for a 30-day I&AP and authority comment period extending from 2 June 2023 to 3 July 2023. I&APs registered on the project database were notified in writing of the release of the EIA Report for comment.

Comments raised, through written correspondence (emails and letters) have been captured in a Comments and Responses Report that is included in Appendix H.7 of this Final EIA Report that has been submitted to the DFFE for decision-making.

The EIA Report includes an EMPr that has been prepared in compliance with the relevant regulations. The content of an EMPr must either contain the information set out in Appendix 4 of the 2014 NEMA EIA Regulations (as amended) or must be a Generic EMPr relevant to an application as identified and gazetted by the Minister in a GN. As part of the 2016 EGI Strategic SEA, a Generic EMPr was compiled for the development and expansion of (a) overhead electricity transmission and distribution infrastructure; and (b) substation infrastructure for the transmission and distribution of electricity. On 2 March 2018, these two Generic EMPrs were gazetted in Government Gazette (GG) 41473, GN 162 and GN 163, for public comment for a period of 45 days. On 22 March 2019, these two Generic EMPrs were gazetted for implementation, in GG 42323, GN 435.

The EMPrs compiled for this proposed project are included in Appendix I and Appendix J of this EIA Report, and therefore separately comply with Appendix 4 of the 2014 NEMA EIA Regulations (as amended) for the proposed Solar PV facility and associated infrastructure, as well as the requirements of the gazetted EMPr for substation infrastructure (Gazette 42323, GN 435), for the Independent Power Producer (IPP) Substation (as Activity 11 of Listing Notice 1 is included in this application).

The Generic EMPr for power lines only applies to aboveground power lines and those that have a capacity of more than 33 kV (i.e. triggering Listed Activity 11 of GN 327 or Listed Activity 9 of GN 325). Therefore, it is understood that the Generic EMPr for the development and expansion of overhead electricity transmission and distribution infrastructure does not apply to any of the proposed projects, as the medium-voltage power lines within the footprint of the Solar PV Facility are planned to have a capacity of 22 or 33 kV (i.e. below the capacity threshold of the relevant listed activity).

The EMPrs are based broadly on the environmental management philosophy presented in the ISO 14001 standard, which embodies an approach of continual improvement. Actions in the EMPr have been drawn primarily from the impact management actions in the specialist assessments for the construction and operational phases of the project. If the project components are decommissioned or re-developed this will need to be done in accordance with the relevant environmental standards and clean-up/remediation requirements applicable at the time. However, general management actions for the decommissioning phase have been provided.

4.6 Public Participation Process

4.6.1 Introduction to the PPP

This section provides an overview of the tasks that have been undertaken in the EIA Phase, with a particular emphasis on providing a clear record of the PPP that has been followed. An integrated PPP was undertaken for the 12 Kudu Solar Facilities (Projects 1 to 12) and for the EGI (Projects 13 to 26), as confirmed with the DFFE during the Pre-Application Meeting⁸.

The integrated PPP for the proposed projects ensured that all public participation documents (such as newspaper advertisements, site notices, notification letters, emails etc.) served to notify I&APs, Stakeholders and Organs of State of the joint availability of reports for the abovementioned projects and provided I&APs with an opportunity to comment on the reports. This approach was undertaken due to the proximity of the sites (i.e., the proposed projects will take place within the same geographical area) and that proposed projects entail the same activity (i.e., generation of energy using a renewable source (i.e., Solar PV), and distribution of electricity via power lines (which are subjected to separate BA and/or EGI Standard Registration Processes)).

Guideline 4 on “*Public Participation in support of the EIA Regulations*” published by the former DEAT in May 2006, states that public participation is one of the most important aspects of the Environmental Assessment Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority to make informed decisions and results in improved decision-making as the view of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently. The DEAT guideline states the following in terms of PPP:

- *“Provides an opportunity for I&APs, EAPs and the Competent Authority to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;*
 - *Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;*
 - *Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;*
 - *Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;*
 - *Is an important aspect of securing transparency and accountability in decision-making;*
and
 - *Contributes toward maintaining a health, vibrant democracy.”*

⁸ At the pre-application phase, a total of 15 PV Projects and 17 EGI Projects were proposed, however following the sensitivity mapping, discussions with landowners and capacities of Bid Window 6, the number of projects have been reduced to 12 PV projects and 14 EGI Projects.

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;
- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion, documents, meetings, workshops, focus group discussions, and the printed and broadcast media;
- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via briefing sessions, public meetings, written submissions or direct contact with members of the EIA team; and
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, the PPP aims to generate issues that are representative of societal sectors, not each individual and has been designed to be inclusive of a broad range of sectors relevant to the proposed project; and
- The PPP will aim to raise a diversity of perspectives and will not be designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP aims to obtain an indication of trade-offs that all stakeholders (i.e., I&APs, technical specialists, the authorities and the development proponent) are willing to accept with regard to the ecological sustainability, social equity and economic growth associated with the project.

The Department of Environmental Affairs (2017), Public Participation guideline in terms of the NEMA EIA Regulations was also considered throughout this Scoping and EIA Process.

The key steps in the PPP for this Scoping and EIA Process are described below and also illustrated in Figure 4.1. This approach is structured in line with the requirements of Chapter 6 (PPP) of the 2014 NEMA EIA Regulations (as amended, i.e., GN R326), as described below. Various mechanisms have been undertaken to provide notice to all potential and registered I&APs of the proposed project, as described below.

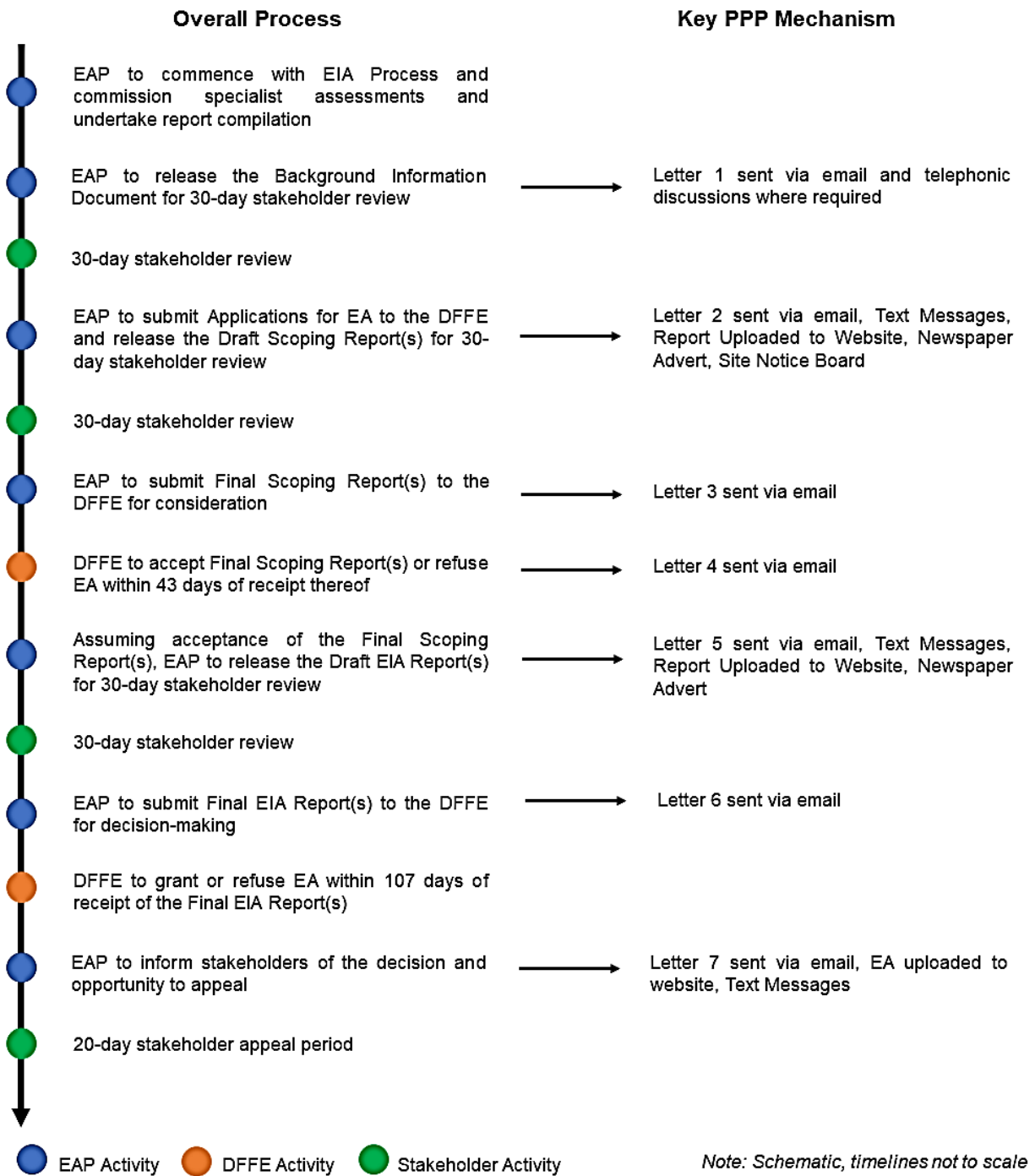


Figure 4.1. Overview of the Scoping and EIA Process and PPP.

4.6.2 Requirement for a Public Participation Plan

The proposed Public Participation Plan was discussed at the Pre-Application Meeting on 26 April 2022, and the plan was submitted via email to the assigned DFFE Case Officers on 6 May 2022. However, the DFFE confirmed via email on 16 May 2022 that Public Participation Plans are no longer required for Applications for EA. Refer to Appendix F.1 of this EIA Report for a copy of this email correspondence, confirming that no Public Participation Plan is required for the proposed project.

4.6.3 Pre-Application Consultation with the DFFE

A request for a Pre-Application Meeting was submitted to the DFFE on 5 April 2022 after which the EAP received a response from the DFFE on 6 April 2022 (Reference Number: 2022-04-0005). The DFFE later confirmed via email that a Pre-Application Meeting was scheduled for 26 April 2022. The Pre-Application Meeting was undertaken in order to discuss and agree on various aspects prior to the commencement of the process. Refer to Appendix D of this EIA Report for the pre-application correspondence with the DFFE.

4.6.4 Landowner Written Consent

Regulation 39 (1) of the 2014 NEMA EIA Regulations (as amended) states that *“if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land”*.

Regulation 39 (2) of the 2014 NEMA EIA Regulations (as amended) further states that *“sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014”*.

There has been no changes to the legislation regarding the above at the time of submitting the Application for EA, therefore, written consent has been obtained from the respective landowners of the affected farm portions on which the non-linear infrastructure is proposed to be located. The written consent was included as an appendix to the Application for EA, which was submitted to the DFFE.

4.6.5 Site Notices

One specific mechanism of informing I&APs of the proposed projects includes the placement of site notice boards. As per the requirements of Regulation 41 (2) (a) of the 2014 NEMA EIA Regulations (as amended), notice boards in the Afrikaans and English languages were placed at the commencement of the Scoping and EIA Process, at the key affected farm portions on which the proposed projects will be constructed, as well as at other strategic locations, such as well-known retail, public and/or government facilities in the wider region, as indicated in Table 4.3.

Table 4.3: Site Notice Board Placement for the Proposed Projects.

Number	Locality / Description	Co-ordinates
1	At the entrance of the Petrusville Community Library on the R48, Petrusville	30°4'55.35"S; 24°39'27.74"E
2	At the entrance of the Frans Jooste Library on the R48, Philipstown	30°26'10.27"S; 24°28'15.51"E
3	At the entrance of the Hennie Liebenberg Junior Library on Voortrekker Street, De Aar	30°39'0.44"S; 24°0'42.46"E
4	At the entrance of the Renosterberg Local Municipality Office on the R48, Philipstown	30°26'8.62"S; 24°28'23.11"E
5	At the entrance of the Renosterberg Local Municipality Office on Skool Street, Petrusville	30° 4'48.58"S; 24°39'24.21"E
6	At the entrance of the Pixley ka Seme District Municipality on Culvert Road, De Aar	30°38'14.31"S; 24°1'21.04"E
7	At the Saamstaan Shopping Centre on Saffier Street, Orania	29°48'47.54"S; 24°24'33.98"E
8	Centrally located between the proposed Kudu Solar Facility 1 and Kudu Solar Facility 2 at an entrance gate to Remaining Extent of the Farm Bas Berg No. 88	30°14'39.15"S; 24°18'15.59"E
9	Centrally located between the proposed Kudu Solar Facility 3 and Kudu Solar Facility 4 along the fence of Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	30°15'43.45"S; 24°18'30.54"E
10	Centrally located at the main access road at the road split, southeast of the proposed Kudu Solar Facility developments	30°17'26.22"S; 24°20'48.07"E
11	Along the fence of Remaining Extent of Portion 3 of the Farm Bas Berg No. 88 on the eastern border of the proposed Kudu Solar Facility 5	30°15'24.33"S; 24°20'0.47"E
12	At an entrance gate of Remaining Extent of Portion 2 (Middel Plaats) (a portion of Portion 1) of the Farm Grasspan No. 40 on the north-eastern border of the proposed Kudu Solar Facility 6	30°11'37.87"S; 24°18'14.99"E
13	Along the fence of Remaining Extent of Portion 2 (Middel Plaats) (a portion of Portion 1) of the Farm Grasspan No. 40 on the southwestern border of the proposed Kudu Solar Facility 7	30°12'16.62"S; 24°18'37.41"E
14	At an entrance gate of Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41 on the southwestern border of the proposed Kudu Solar Facility 11	30°10'12.20"S; 24°21'5.70"E
15	Along the fence of Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41 on the northern border of the proposed Kudu Solar Facility 10	30°10'32.53"S; 24°22'2.50"E

Refer to Appendix F.6 of this EIA Report for a copy of the content and proof of placement of the site notice boards.

4.6.6 Key Steps of the PPP for the EIA Phase

The section below outlines the PPP for the EIA Phase of this assessment in order to provide potential I&APs, Stakeholders and Organs of State access to information on the project and the opportunity to comment.

4.6.6.1 Task 1 – I&AP Review of the Draft EIA Report and EMPr

The first stage in the process entailed the release of the EIA Report for a 30-day I&AP and stakeholder comment period, which extended from 2 June 2023 to 3 July 2023 (excluding public holidays). Relevant stakeholders, Organs of State and I&APs were informed of the review period in the following manner:

- Database Maintenance:** In line with Regulation 42 of GN R326, an initial database of potential I&APs (including key stakeholders and Organs of State) was developed for the Scoping and EIA processes and has been updated throughout the process. Appendix E of this EIA Report includes a copy of the latest I&AP database, which indicates interaction with I&APs, key stakeholders and all I&APs that have been added to the electronic project database thus far, including those that have submitted comments, to date. While I&APs have been encouraged

to register their interest in the project from the start of the process, following the public announcements, the identification and registration of I&APs was ongoing for the duration of the study. As a result, I&AP details were captured and automatically updated as and when information was distributed to or received from I&APs. This ongoing record of communication is an important component of the PPP. While not required by the regulations, those I&APs proactively identified at the outset of the Scoping and EIA Process remain on the project database throughout the process and have been kept informed of all opportunities to comment and will only be removed from the database by request. The updated database was used to provide written notification of the release of the EIA Report for comment.

- **Protection of Personal Information:** In accordance with the Protection of Personal Information Act (Act 4 of 2013), the CSIR aimed to conduct itself responsibly when collecting, processing, storing and sharing any personal information collected for the purposes of PPP in terms of the 2014 NEMA EIA Regulations (as amended). By registering as an I&AP and/or submitting information and comments, the stakeholder essentially consents to the collection, collation, processing, and storing of such information and the use and disclosure of such information for the aforementioned purpose⁹. This was explained on all correspondence sent throughout the EIA Process. The stakeholders were also given an opportunity to send an email to the EAP if they wished to opt out of communications on the proposed project.
- **Advertisements to Register Interest:** In line with Regulation 41 (2) (c) of the 2014 NEMA EIA Regulations (as amended), in order to notify and inform the public of the proposed projects, to invite I&APs to register on the project database, as well as to inform I&APs of the release of the DSRs for comment, the Scoping and EIA Processes was advertised in the following three local newspapers at the commencement of the 30-day comment period for the DSR: a) Echo/Midland News; b) Noordkaap Bulletin; and c) Bloemnuus. Refer to Appendix F.7 of this EIA Report for a copy of the newspaper advertisements placed during Scoping.

Adverts were also placed in the same newspapers for the 30-day comment period on the EIA Report. Refer to Appendix H.3 of this EIA Report for a copy of the content of, and proof of placement of, the newspaper advertisements. The content of the newspaper advertisement complied with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended) and also included the details of the project website, where information available on the proposed project can be downloaded from.

There were no official Gazettes published specifically for the purpose of providing public notice of applications or other submissions made in terms of the 2014 NEMA EIA Regulations (as amended).

- **Letter 4¹⁰ to I&APs (Outcome of the consideration of the FSR and commencement of the EIA Phase for Kudu Solar Facility 1 to 12):** Written notification of the outcome of the consideration of the FSR and the commencement of the EIA Phase (i.e. Letter 4) was sent to all I&APs and Organs of State included on the updated project database via email, where email addresses are available. Letter 4 was sent in May 2023 and included a notification of the commencement of the EIA Phase for the proposed projects, and was written in English. Copies of Letter 4 and the emails sent are included in Appendix F.14 of this EIA Report.

⁹ CSIR Privacy Notice. Website: <https://www.csir.co.za/csir-privacy-notice>

¹⁰ Note that Letters 1, 2, and 3 are addressed in Chapter 4 of the FSR (CSIR, 2023) and apply to the Scoping Phase.

- **Submission of the Amended Application for EA and Draft EIA Report to the DFFE and DFFE Acknowledgement of Receipt:** The Amended Application Form for EA and Draft EIA Report were submitted to the DFFE via the DFFE Novell S-Filer System on 2 June 2023 and proof of upload was emailed to the DFFE. Proof of submission of the EIA Report for comment and Amended Application for EA to the DFFE, and proof of upload to the DFFE Novell S-Filer System are included in Appendix H.5 of this EIA Report. The DFFE sent an email on 6 June 2023 acknowledging receipt of the Amended Applications for EA and EIA Reports for comment on 2 June 2023 (as included in Appendix H.5).
- **Letter 5 to I&APs (Availability of the EIA Reports for Kudu Solar Facility 1 to 12 for public comment):** Written notification of the availability of the EIA Reports (i.e. Letter 5) was sent to all I&APs, Stakeholders and Organs of State included on the updated project database via email, where email addresses are available. This letter was sent at the commencement of the 30-day review period on the EIA Report (i.e. on 2 June 2023), and included information on the proposed projects and notification of the release and availability of the reports. Letter 5 was written in English. Proof of email, as well as copies of the Letter 5, are included in Appendix H.4 of these Final EIA Reports that have been submitted to the DFFE for decision-making.
- **Text Messaging:** SMS texts were sent to all I&APs on the updated project database, where cell phone numbers are available, to inform them of the proposed projects and how to access the EIA Reports available for comment. These text messages were sent on 3 June 2023 for the release, and 21 June 2023 as a reminder of the comment period closure. Refer to Appendix H.4 of this Final EIA Report for proof of text message consultation.
- **Local Networks:** Where possible, communication was made, via telephonic calls and text messages, with the a Municipal Ward Councillor to provide information on the EIA Reports that were available for comment, and to request that they inform stakeholders, including the municipal officials, about the proposed project, with the overall aim to send notifications of the proposed projects, and report availability via their local networks (such as WhatsApp groups, Neighbourhood Watch groups, Farmers Unions, other social media mechanisms etc.). However, since the Renosterberg Local Municipality is under administration, communication with Councillors was difficult. Nonetheless, communication via telephone call, SMS, and email was made, and proof of such is included in Appendix H.4 of this EIA Report.
- **30-day Comment Period:** As noted above, potential I&APs, including authorities and Organs of State, were notified via Letter 5, of the 30-day comment and registration period within which to submit comments on the EIA Reports and/or to register on the I&AP database.
- **Executive Summaries:** Links to the Executive summaries of the EIA Reports were emailed to I&APs on the database, where email addresses are available, together with Letter 5, and these were also uploaded to the project website and alternative web-platforms.
- **Availability of Information:** The EIA Reports were made available for a 30-day comment period and was distributed electronically to ensure access to information. The EIA Reports were uploaded to the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>) for I&APs to access it. As a supplementary mechanism, the EIA Reports were also uploaded to another alternative web-platform (i.e., Google Drive: https://bit.ly/KUDU_SOLAR_PV). As noted in the EIA Report, if an I&AP could not access the

reports via the project website or Google Drive, and if additional information was required (other than what was provided in the Executive Summaries), then the I&AP could contact the EAP, to then make an electronic copy available (where feasibly possible). However, no such requests were received during the 30-day comment period on the Draft EIA Reports.

- **Reminder / Follow Up Emails of the Comment Period Closure:** A number of reminder / follow up emails informing stakeholders of the comment period closure and to seek comments were sent to I&APs, stakeholders and Organs of State included on the project database, where email addresses are available. Reminder emails were sent on 8 June 2023, 21 June 2023, 30 June 2023 and 3 July 2023. In addition, personalised reminder emails were sent on 22 June 2023 and thereafter. Refer to Appendix H.4 of this EIA Report for proof of such correspondence.
- **Telephonic calls:** During the 30-day comment period, key stakeholders were called telephonically, followed by a confirmation of discussion email or text message. Refer to Appendix H.4 of this EIA Report for proof of such correspondence.
- **Comments Received:** A key component of the Scoping and EIA Process is documenting and responding to the comments received from I&APs and the authorities. Copies of all comments received during the 30-day review of the EIA Report are included in Appendix H.6 of this EIA Report, as well as in the Comments and Responses Trail in Appendix H.7. Comments/feedback were received from the following stakeholders during the 30-day review of the EIA Report:
 - DFFE Chief Directorate: Integrated Environmental Authorisations (Competent Authority);
 - DFFE: Biodiversity Conservation / CBO: Biodiversity Mainstreaming and EIA Directorate;
 - DFFE: Protected Areas Planning and Management Effectiveness Directorate;
 - Department of Water and Sanitation;
 - Department of Defence;
 - Department of Agriculture, Land Reform and Rural Development (DALRRD): Directorate Land and Soil Management;
 - Eskom;
 - SAHRA;
 - Northern Cape Heritage Resources Authority;
 - BirdLife South Africa;
 - South African Civil Aviation Authority; and
 - Various private individuals / I&APs.

Note that the correspondence received from stakeholders (i.e. the DALRRD, Telkom and I&APs) between the submission of the FSRs and release of the EIA Reports for the 30-day comment period are included in Appendix H.1 of this EIA Report; and are also responded to in Appendix H.7. Also note that correspondence with a specific stakeholder regarding the visual impacts of the Kudu Solar Facilities on their Farm Portion and Farmstead (Correspondence between the submission of the FSR for Decision-Making and the release of the Draft EIA Report) is included in Appendix H.2 of this EIA Report.

4.6.6.2 Task 2 – Comments and Responses Report

A key component of the EIA process is documenting and responding to the comments received from I&APs and the authorities. Copies of all written comments received during the review of the EIA Reports have been compiled into a Comments and Responses Report included in Appendix H.7 of these Final EIA Reports that have been submitted to the DFFE for decision-making. The Comments and Responses Report indicate the nature of the comment, as well as when and who raised the comment. The comments received have been considered by the EIA team and appropriate responses provided by the EIA team, the Project Developer and/or specialists. The response provided indicates how the comment received has been dealt with in the EIA Process and considered in the Final EIA Reports, the project design or EMPs. If the comment received falls beyond the scope of this EIA, clear reasoning has been provided.

4.6.6.3 Task 3 – Compilation of the Final EIA Reports and Submission to DFFE (Current Stage)

Following the 30-day commenting period on the EIA Reports and incorporation of the comments received into the reports, the Final EIA Reports are submitted to the DFFE for decision-making in line with Regulation 23 (1) (a) of the 2014 NEMA EIA Regulations (as amended). The reports have been submitted electronically to the DFFE via the Novell S-Filer system, as recommended by the DFFE since June 2020.

In line with best practice, I&APs on the project database will be notified via **Letter 6** via email (where email addresses are available) of the submission of the Final EIA Reports to the DFFE for decision-making. To ensure ongoing access to information, copies of the Final EIA Reports that have been submitted for decision-making and the Comments and Response Reports (detailing comments received during the EIA Phase and responses thereto) will be placed on the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>). As a supplementary mechanism, the Final EIA Reports will also be uploaded to other alternative web-platforms such as Dropbox or Google Drive.

The Final EIA Reports, submitted to the DFFE for decision-making, includes proof of the PPP that was undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the EIA Reports for the 30-day comment period (as explained above).

The DFFE will have 107 days (from receipt of the Final EIA Reports) to either grant or refuse EA (in line with Regulation 24 (1) of the 2014 NEMA EIA Regulations, as amended).

4.6.6.4 Task 4 – Environmental Authorisation (EA) and Appeal Process

Subsequent to the decision-making phase, if EAs are granted by the DFFE for the proposed projects, all registered I&APs, Organs of State and Stakeholders on the project database will receive notification of the issuing of the EAs and the associated appeal period. The 2014 NEMA EIA Regulations (as amended) (i.e. Regulation 4 (1)) states that after the Competent Authority has reached a decision, it must inform the Project Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) of the 2014 NEMA EIA Regulations (as amended) stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision.

The distribution of the EAs (should such authorisations be granted by the DFFE), as well as the notification of the appeal period, will include a letter (i.e. **Letter 7** (Release of EAs and Notification of Opportunity to Appeal)) to be sent via email to all registered I&APs, Stakeholders and Organs of State on the project database, where email addresses are available. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EAs. The EAs will be uploaded to the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>). SMS texts will also be sent to all I&APs on the database, where cell phone numbers are available, to inform them of the EAs (should they be granted).

4.7 Authority Consultation during the EIA Phase

Authority consultation is integrated into the PPP, with meetings or discussions held on online platforms with the lead authorities, where necessary. The Competent Authority (DFFE) as well as other lead authorities were consulted at various stages during the EIA Process. The following key authorities have been identified for the purpose of this EIA Process:

- Air Traffic Navigation Services (ATNS)
- AgriSA;
- Birdlife South Africa;
- Department of Transport;
- Department of Water and Sanitation;
- DALRRD;
- DFFE Integrated Environmental Authorisations Directorate;
- DFFE Biodiversity and Conservation Directorate;
- DFFE Protected Areas Directorate;
- Endangered Wildlife Trust;
- Eskom SOC Ltd;
- National Energy Regulator of South Africa (NERSA);
- Ngwao Boswa Kapa Bokoni (Heritage Northern Cape);
- Northern Cape DAEARDLR;
- Pixley Ka Seme District Municipality;
- Renosterberg Local Municipality;
- South African Civil Aviation Authority (CAA);
- SAHRA;
- South African Local Government Association (SALGA) (Northern Cape)
- South African National Parks (SANParks);
- South African National Roads Authority (SANRAL);
- South African Radio Astronomy Observatory (SARAO);
- South African Weather Services;
- VulPro;
- Wildlife and Environmental Society of South Africa (WESSA); and
- World Wildlife Fund (WWF).

The authority consultation process for the EIA Phase is outlined in Table 4.4 below.

Table 4.4: Authority Communication Schedule.

STAGE IN EIA PHASE	FORM OF CONSULTATION
During the EIA Process (most likely on submission of the EIA Report for decision-making)	Site visit with authorities (including DFFE), if required.
During preparation of EIA Report	Communication (via email or online platforms (i.e. Microsoft Teams) with the DFFE as required.
On submission of EIA Report for comment	Online meetings with dedicated departments, if requested by the DFFE, with jurisdiction over particular aspects of the project (e.g. Local Authority). This was not requested during the EIA Process.

4.8 Schedule for the Scoping and EIA Processes

The proposed schedule for the Scoping and EIA Processes based on the legislated EIA timeframes, is presented in Table 4.5.

As noted above, the BA and/or EGI Standard Registration Processes will be undertaken separately for the EGI Projects 13 to 26. However, where possible the processes will be aligned with the Scoping and EIA Processes as best as possible, including PPP mechanisms, where relevant.

Table 4.5: Schedule for the proposed Kudu Solar Facilities 1 to 12 (Projects 1 to 12).

Key Milestones	Proposed Timeframe
Appointment of CSIR by the Developer (i.e. ABO Wind)	December 2021
Appointment of Specialists	January 2022 to early March 2022
Specialist Site Visits	February 2022 to May 2022
Project Initiation and Pre-Application Consultation with the Department of Forestry, Fisheries and the Environment (DFFE)	April 2022
Approval of Notes of the Pre-Application Meeting	16 May 2022
Submission of Combination Request	26 May 2022
DFFE Decision on the Combination Request	21 June 2022
Release Background Information Document (BID) for 30-day comment period for the Kudu Solar Facilities Environmental Impact Assessment (EIA) Projects and the Electricity Grid Infrastructure (EGI) Basic Assessment (BA) Projects	6 June 2022 to 7 July 2022 (excluding Public Holidays)
Specialist Inputs to the Draft Scoping Reports (DSRs) for the Kudu Solar Facilities EIA Projects (Projects 1 to 12)	May 2022 to December 2022
Prepare DSRs and Plan of Study for EIA including specialist inputs for the Kudu Solar Facilities EIA Projects (Projects 1 to 12)	May 2022 to December 2022

Key Milestones	Proposed Timeframe
Release DSRs for the Kudu Solar Facilities EIA Projects (Projects 1 to 12) for 30-day comment period	9 December 2022 to 30 January 2023 (excluding mandatory regulated shutdown period)
Submit Final Scoping Reports (FSRs) for the Kudu Solar Facilities EIA Projects (Projects 1 to 12) to the DFFE for Consideration	13 February 2023
DFFE to Accept FSRs for the Kudu Solar Facilities EIA Projects (Projects 1 to 12) or Refuse EAs	24 to 29 March 2023
Specialist Assessments for the Kudu Solar Facilities EIA Projects (Projects 1 to 12)	December 2022 to mid-April 2023
Prepare Draft EIA Reports for the Kudu Solar Facilities EIA Projects (Projects 1 to 12)	December 2022 to end May 2023
Release Draft EIA Reports for the Kudu Solar Facilities EIA Projects (Projects 1 to 12) for 30-day comment period	2 June 2023 to 3 July 2023 (excluding public holidays)
Submit Final EIA Reports for the Kudu Solar Facilities EIA Projects (Projects 1 to 12) to the DFFE for Decision-Making	Mid-July 2023
DFFE Decision-Making on the Final EIA Reports and issue of Decisions (i.e., grant or refuse EA): 107 days	End-October 2023
EAP to Notify I&APs of Decisions (14 days)	Mid-November 2023

4.9 Approach to the Impact Assessment Methodology and Specialist Assessments

This section outlines the assessment methodology for the specialist assessments, as recommended by the then Department of Environmental Affairs (DEA) 2006 Guideline on Assessment of Impacts.

4.9.1 Impact Assessment Methodology

The Impact Assessment Methodology has been aligned with the requirements for EIA Reports as stipulated in Appendix 3 (3) (1) (j) of the 2014 NEMA EIA Regulations (as amended) which states the following:

“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 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”.*

The identification of potential impacts includes impacts that may occur during the construction, operational and decommissioning phases of the development. The assessment of impacts includes direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed project is well understood so that the impacts associated with the project can be assessed. The process of identification and assessment of impacts includes:

- Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determining future changes to the environment that will occur if the activity does not proceed;
- Develop an understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts, which are likely to occur if the activity is undertaken.

The following principles underpin the application of this methodology:

- Transparent and repeatable process - specialists are to describe the thresholds and limits they apply in their assessment, wherever possible.
- Adapt parameters to context (where justified) – the methodology proposes some thresholds (e.g. for spatial extent, in Step 3 below), however, if the nature of the impact requires a different definition of the categories of spatial extent, then this can be provided and described by the specialist.
- Combination of a quantitative and qualitative assessment – where possible, specialists are to provide quantitative assessments (e.g. areas of habitat affected, number of jobs), however, it is recognised that not all impacts can be quantified, and then qualitative assessments are to be provided.

As per the then DEAT Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of direct, indirect and cumulative impacts:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

In addition to the above, the Impact Assessment Methodology includes the following aspects:

- **Step 1: Nature of impact/risk** - this reviews the type of effect that a proposed activity will have on the environment and includes “what will be affected and how?” The term environment has a broad interpretation that includes both the natural (biophysical) environment and the socio-economic environment. The term socio-ecological system is also used to describe the natural and socio-economic environment and the interactions amongst these components.
- **Step 2: Status** - Whether the impact/risk on the overall environment (social, biophysical and economic) will be:
 - Positive - environment overall will benefit from the impact/risk;
 - Negative - environment overall will be adversely affected by the impact/risk; or
 - Neutral - environment overall will not be affected.
 - Note: The significance of a negative impact may be called a risk, and the significance of a positive impact may be called an opportunity.
- **Step 3:** Qualitative determination of the consequence of the impact/risk by identifying the a) spatial extent; b) duration; c) reversibility; and d) irreplaceability.
 - **A) Spatial extent** – The size of the area that will be affected by the impact/risk:
 - Site specific;
 - Local (<10 km from site);
 - Regional (<100 km of site / within the district municipality);
 - National; or
 - International (e.g. Greenhouse Gas emissions or migrant birds).
 - **B) Duration** – The timeframe during which the impact/risk will be experienced:
 - Very short term (instantaneous);
 - Short term (less than 1 year);
 - Medium term (1 to 10 years);
 - Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or
 - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).
 - **C) Reversibility** of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
 - High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);
 - Moderate reversibility of impacts;
 - Low reversibility of impacts; or
 - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).
 - **D) Irreplaceability** of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):

- High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);
- Moderate irreplaceability of resources;
- Low irreplaceability of resources; or
- Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

These criteria are then combined in a qualitative manner to determine the **consequence**. The consequence terms ranging from slight to extreme (as described below) are calibrated per Specialist Study, where required, so that there is transparency and consistency in the way a risk/impact is measured.

- **Consequence** – The anticipated consequence of the risk/impact is generally defined as follows:
 - Extreme (extreme alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they permanently cease);
 - Severe (severe alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease);
 - Substantial (substantial alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease);
 - Moderate (notable alteration of natural or socio-economic systems, patterns or processes, i.e. where the natural or socio-economic environment continues to function but in a modified manner; or
 - Slight (negligible and transient alteration of natural or socio-economic systems, patterns or processes, i.e. where natural systems/environmental or socio-economic functions, patterns, or processes are not affected in a measurable manner, or if affected, that effect is transient and the system recovers).

- **Step 4:** The **probability** of the impact/risk must be rated using the criteria below:
 - **Probability** – The probability of the impact/risk occurring:
 - Extremely unlikely (little to no chance of occurring);
 - Very unlikely (<30% chance of occurring);
 - Unlikely (30-50% chance of occurring)
 - Likely (51 – 90% chance of occurring); or
 - Very Likely (>90% chance of occurring regardless of prevention measures).

- **Step 5:** Determination of the **significance** of the identified impact/risk using both the **consequence** and **probability** (qualitatively as shown in Figure 4.2). The approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without

mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, very high) against a predefined set of criteria. Significance definitions and rankings are provided below:

Probability	Very Likely					Very High Risk/Impact
	Likely				High Risk/Impact	
	Unlikely			Moderate Risk/Impact		
	Very Unlikely		Low Risk/Impact			
	Extremely Unlikely	Very Low Risk/Impact				
		Slight	Moderate	Substantial	Severe	Extreme
		Consequence**				

****[Qualitatively determined based on Spatial Extent, Duration, Reversibility and Irreplaceability]**

Figure 4.2. Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
 - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
 - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
 - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
 - High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and
 - Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- Very low = 5;
 - Low = 4;
 - Moderate = 3;
 - High = 2; and
 - Very high = 1.
- **Step 6:** Determine the **Confidence Level** – The degree of confidence in predictions based on available information and specialist knowledge:
 - Low;
 - Medium; or
 - High.

Other aspects taken into consideration in the assessment of impact significance are:

- Impacts are to be evaluated for the construction, operational and decommissioning phases of the development. The assessment of impacts for the decommissioning phase is brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- Impacts are evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation takes into consideration, where possible, the cumulative effects associated with this and other Wind and Solar PV, and EGI, projects which are either developed or in the process of being developed in the local area (i.e. within 30 km from the proposed Kudu Solar Facilities). Refer to Section 4.9.2 for a description of the cumulative impact assessment methodology; and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct, indirect and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

Impacts are then collated into the EMPr, which include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements are set. This includes a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness;
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this is stated; and
- Positive impacts and augmentation measures are identified to potentially enhance positive impacts where possible.

Table 4.6 below has been used by the specialists for the rating of impacts, and repeated for the Construction, Operational and Decommissioning Phases.

Table 4.6: Example of Table for Assessment of Impacts/Risks.

<i>Impact</i>	<i>Impact Criteria</i>		<i>Significance and Ranking (Pre-Mitigation)</i>	<i>Potential mitigation measures</i>	<i>Significance and Ranking (Post-Mitigation)</i>	<i>Confidence Level</i>
CONSTRUCTION PHASE						
<i>Habitat and species loss as a result of clearance of vegetation for the PV Facility</i>	Status	<i>Negative</i>	<i>Moderate (3)</i>	<i>Plant search and rescue (EMPr)</i>	<i>Low (4)</i>	<i>Medium</i>
	Spatial Extent	<i>Site Specific</i>				
	Duration	<i>Long-term</i>				
	Consequence	<i>Substantial</i>				
	Probability	<i>Very likely</i>				
	Reversibility	<i>Moderate</i>				
Irreplaceability	<i>Moderate</i>					

4.9.2 Cumulative Impact Assessment Methodology

The cumulative impact assessment includes the impact of the Kudu Solar Facilities and other renewable energy projects (i.e. Wind and Solar PV) and EGI projects within a 30 km radius of the proposed projects that are in different stages of planning and/or development. At the time of submission of the FSR to the DFFE for consideration, the various renewable energy projects that were to be considered in the cumulative impact assessment had either received an EA, the Environmental Assessment was in progress, or the project had been constructed. Under some instances, usually only authorised projects are considered in the cumulative assessment. However, for this project various project statuses were considered based on the comments received during the pre-application meeting with the DFFE. In addition, other existing and planned Eskom power lines have also been taken into consideration. It must be re-iterated that some of the projects considered in the cumulative impact assessment are only in the Environmental Assessment phase, and such projects are most likely going to be subjected to a competitive tender process, therefore its development is not guaranteed.

The information has been sourced from the National DFFE Renewable Energy EIA Application (REEA) database; as well as from the SAHRIS and the Eskom Generation Connection Capacity Assessment (GCCA) (2022). Table 4.7 provides more details, whilst Figure 4.3 provides an illustration of the projects that have been considered in the cumulative impact assessment. All withdrawn or lapsed projects have not been considered. Each project has been allocated a specific number indicated in the table below, which correlates to the display on the map below, for ease of reference.

Refer to each specialist assessment in Chapters 6 to 17 of this EIA Report for a description on how cumulative impacts have been identified.

A summary of the general process flow followed in the cumulative impact assessment is provided below:

- A list of Renewable Energy and EGI projects within a 30 km radius was identified based on research, SAHRIS, REEA and the Eskom 2022 GCCA.
- The cumulative impacts were then clearly defined, and **where possible** the size of the identified impact was quantified and indicated. In most cases the actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. For example, the REEA database contains land parcels, and not the footprints. Hence the land parcels were considered, which took into account the worst case. This typically allowed the determination of the following aspects (or similar aspects) in the relevant specialist assessments:
 - The total affected land parcel area taken up by the other renewable energy projects and EGI within the 30 km radius.
 - The total affected land parcel area of the 12 Kudu Solar Facilities.
 - Combined land parcel area affected by the renewable energy developments within the 30 km radius.
 - The total area within the 30 km radius around the proposed projects of similar habitat.
 - The total combined size of the land parcels affected by renewable energy and EGI projects as a percentage of the available habitat in the 30 km radius.
- Therefore, the assessment of cumulative impacts was based on the specialist and EAP's knowledge of similar approved Renewable Energy and EGI projects in the 30 km radius. In some cases, the specialists involved in this Scoping and EIA Process were also involved in other Renewable Energy Projects within the larger region, thus being well aware of the type of impacts and mitigation measures recommended. The specialists assessed such impacts based on their expertise and knowledge of similar projects and management actions. However, the following points are important to note in terms of the cumulative impact assessment:
 - Some of projects in the 30 km radius employ wind turbines, which present fundamentally different impacts and externalities that may affect the broader ecology of the region. Furthermore, the majority of the mitigation measures adopted for wind energy facilities do not necessarily apply to Solar PV, such as those relating to avifaunal collisions, noise from turbines, and visual screening.
 - The assessment of cumulative impacts is not necessarily solely focused on an assessment of impacts linked to previously authorised similar developments and consideration of their mitigation measures, but also about the sensitivities of the land on which the projects take place.
 - From a heritage perspective, these impacts are difficult to quantify because of the variable survey conditions that are likely to have pertained during the assessments of the various projects. Nonetheless, it is noted that archaeological finds in the areas typically considered for development in the grasslands tend to be minimal, while finds on hills tend to be avoided in the construction of wind energy facilities.

Refer to the relevant specialist studies for additional information.

Table 4.7: Renewable energy and EGI projects, located within 30 km of the proposed Kudu Solar Facilities, that are considered in the Cumulative Impact Assessment (Source: DFFE REEA, Quarter 4, 2022; and SAHRIS).

CSIR NUMBER	DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE	EIA REGULATIONS	ASSESSMENT PROCESS	APPLICANT	EAP
1	<ul style="list-style-type: none"> 12/12/20/2258 12/12/20/2258/1 	Solar PV	75	Approved and Preferred Bidder (Operational)	<ul style="list-style-type: none"> The Proposed Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape Province - Kalkbult 	2010	Scoping and EIA	Scatec Solar SA Pty Ltd	Sustainable Development Projects cc
2	<ul style="list-style-type: none"> 12/12/20/2463/1 12/12/20/2463/1/2 12/12/20/2463/1/A2 12/12/20/2463/1/AM3 12/12/20/2463/1/AM4 12/12/20/2463/1/AM5 	Onshore Wind	140	Approved and Preferred Bidder (Operational)	<ul style="list-style-type: none"> Longyuan Mulilo De Aar 2 North Wind Energy Facility Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility The Wind Energy Facility (North and South) situated on the Plateau Near De Aar, Northern Cape Province 	2010 and 2014	Scoping and EIA and Amendment	Longyuan Mulilo De Aar 2 South (Pty)	Aurecon South Africa (Pty) Ltd and Holland and Associates Environmental Consultants
3	<ul style="list-style-type: none"> 12/12/20/2463/2 12/12/20/2463/2/AM2 	Onshore Wind	100	Approved and Preferred Bidder (Operational)	<ul style="list-style-type: none"> Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility The Wind Energy Facility (North and South) Situated On The Plateau Near De Aar, Northern Cape Province 	2010 and 2014	Scoping and EIA and Amendment	Mulilo Renewable Energy (Pty) Ltd	Aurecon South Africa (Pty) Ltd
4	<ul style="list-style-type: none"> 14/12/16/3/3/1/1166 14/12/16/3/3/1/1166/AM3 14/12/16/3/3/1/1166/AM4 	Transmission line	132	Approved	<ul style="list-style-type: none"> Basic Assessment for the proposed construction of a 132 kV transmission line corridor adjacent to the existing Eskom transmission line from Longyuan Mulilo De Aar 2 North Wind Energy Facility (WEF) to the Hydra Substation in De Aar, Northern Cape 	2010 and 2014	Basic Assessment	Longyuan Mulilo De Aar 2 North (Pty) Ltd	Aurecon South Africa (Pty) Ltd
5	<ul style="list-style-type: none"> 14/12/16/3/3/1/785 	Transmission line	132	Approved	<ul style="list-style-type: none"> Proposed construction of two 132kV transmission lines from the South & North Wind Energy Facilities on the Eastern Plateau (De Aar 2) near De Aar, Northern Cape. 	2010	Basic Assessment	Mulilo Renewable Energy (Pty) Ltd	Aurecon South Africa (Pty) Ltd
6	<ul style="list-style-type: none"> 14/12/16/3/3/2/278 14/12/16/3/3/2/278/1 14/12/16/3/3/2/278/2 	Onshore Wind	118	Approved	<ul style="list-style-type: none"> Proposed Castle Wind Energy Facility Project, located near De Aar, Northern Cape 	2010 and 2014	Scoping and EIA	Castle Wind Farm (Pty) Ltd	Aurecon South Africa (Pty) Ltd; and Savannah Environmental Consultants (Pty) Ltd
7	<ul style="list-style-type: none"> 14/12/16/3/3/2/564 14/12/16/3/3/2/564/AM1 14/12/16/3/3/2/564/AM2 	Solar PV	75	To be confirmed	<ul style="list-style-type: none"> Proposed Swartwater 75MW solar PV power facility in Petrusville within Renosterburg Local Municipality, Northern Cape 	2010 and 2014	Scoping and EIA and Amendment	AE-AMD Renewable Energy (Pty) Ltd	USK Environmental and Waste Engineering (Pty) Ltd
8	<ul style="list-style-type: none"> 14/12/16/3/3/2/740 	Solar PV	300	Approved	<ul style="list-style-type: none"> Proposed 300MW Solar Power Plant in Phillipstown area in Renosterberg Local Municipality 	2010	Scoping and EIA	To be confirmed	Tshikovha Environmental and Communication Consultants
9	<ul style="list-style-type: none"> 14/12/16/3/3/2/744 	Solar PV	Unknown	Approved	<ul style="list-style-type: none"> Proposed PV facility on farm Jakhalsfontein near De Aar 	2010	Scoping and EIA	Solar Capital (Pty) Ltd	Eco Compliance (Pty) Ltd
10	<ul style="list-style-type: none"> 14/12/16/3/3/2/739 	Solar PV	70 - 100	To be confirmed	<ul style="list-style-type: none"> Proposed 70 - 100 MW Solar Power Plant in Petrusville 	2010	Scoping and EIA	To be confirmed	Tshikovha Environmental and Communication Consultants
11	<ul style="list-style-type: none"> Not issued yet (it is understood that the project is still within the pre-application stage) 	Solar PV	800 (Maximum)	Pre-Application	<ul style="list-style-type: none"> The Proposed Keren Energy Odyssey Solar PV Facilities (Odyssey Solar 1, Odyssey Solar 2, Odyssey Solar 3, Odyssey Solar 4, Odyssey Solar 5, Odyssey Solar 6, Odyssey Solar 7 And Odyssey Solar 8) 	2014	Scoping and EIA	Keren Energy Group Holdings	EnviroAfrica cc
12 ¹¹	<ul style="list-style-type: none"> Tafelkop Solar PV: 14/12/16/3/3/2/2272 Koppy Allen Solar PV: 14/12/16/3/3/2/2273 Vrede Solar PV: 14/12/16/3/3/2/2274 Zionshevel Solar PV: 14/12/16/3/3/2/2277 	Solar PV	3050	EIA Phase	<ul style="list-style-type: none"> The Proposed Development of the Crossroads (formally referred to as the Hydra B) Green Energy Cluster of Renewable Energy Facilities and Grid Connection Infrastructure, Pixley Ka Seme District Municipality, Northern Cape Province. The Cluster entails the development of up to 21 solar energy facilities, with the Scoping and EIA Processes consisting of three phases. Phases 1, 2 and 3 consist of 9, 6 and 6 solar facilities, respectively. The Phase 1 Scoping and EIA Processes were launched in 	2014	Scoping and EIA	Akuo Energy Afrique	Savannah Environmental Consultants (Pty) Ltd

¹¹ At the time of finalization of this EIA Report for the proposed Kudu Solar Facility, the mapping files for the proposed Cross Roads Green Energy Cluster were provided for Phase 1 of the development only. Hence Phase 2 and Phase 3 are not spatially shown on Figure 4.3.

CSIR NUMBER	DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE	EIA REGULATIONS	ASSESSMENT PROCESS	APPLICANT	EAP
	<ul style="list-style-type: none"> Amper Daar Solar PV: 14/12/16/3/3/2/2278 Wag-'n-Bietjie Solar PV: 14/12/16/3/3/2/2279 Ruspoort 1 Solar PV: 14/12/16/3/3/2/2280 Ruspoort 2 Solar PV: 14/12/16/3/3/2/2281 Middelplaas Solar PV: 14/12/16/3/3/2/2282 				January 2023. Phase 1 of this development is only considered in this cumulative impact assessment.				
Study area shown on map	<ul style="list-style-type: none"> Kudu Solar Facility 1: 14/12/16/3/3/2/2244 Kudu Solar Facility 2: 14/12/16/3/3/2/2245 Kudu Solar Facility 3: 14/12/16/3/3/2/2246 Kudu Solar Facility 4: 14/12/16/3/3/2/2247 Kudu Solar Facility 5: 14/12/16/3/3/2/2248 Kudu Solar Facility 6: 14/12/16/3/3/2/2249 Kudu Solar Facility 7: 14/12/16/3/3/2/2250 Kudu Solar Facility 8: 14/12/16/3/3/2/2251 Kudu Solar Facility 9: 14/12/16/3/3/2/2252 Kudu Solar Facility 10: 14/12/16/3/3/2/2253 Kudu Solar Facility 11: 14/12/16/3/3/2/2254 Kudu Solar Facility 12: 14/12/16/3/3/2/2255 	Solar PV	2180	Scoping and EIA Process underway (Final EIA Report submitted in July 2023)	<ul style="list-style-type: none"> Proposed Development of 12 Solar Photovoltaic (PV) Facilities (Kudu Solar Facility 1 to 12) and associated infrastructure, near De Aar, Northern Cape Province 	2014	Scoping and EIA	Kudu Solar Facility 1 (Pty) Ltd to Kudu Solar Facility 12 (Pty) Ltd	CSIR
Shown on map as Existing HV Lines	<ul style="list-style-type: none"> N/A 	Transmission Line	220	Existing Power Line	<ul style="list-style-type: none"> HYDRA ROODEKUIL 2 	-	-	-	-
Shown on map as Existing HV Lines	<ul style="list-style-type: none"> N/A 	Transmission Line	132	Existing Power Line	<ul style="list-style-type: none"> HYDRA ROODEKUIL 1 	-	-	-	-
Shown on map as Existing HV Lines	<ul style="list-style-type: none"> N/A 	Transmission Line	765	Existing Power Line	<ul style="list-style-type: none"> BETA HYDRA 2 	-	-	-	-
Shown on map as Existing HV Lines	<ul style="list-style-type: none"> N/A 	Transmission Line	400	Existing Power Line	<ul style="list-style-type: none"> HYDRA PERSEUS 3 	-	-	-	-
Shown on map as Existing HV Lines	<ul style="list-style-type: none"> N/A 	Transmission Line	220	Existing Power Line	<ul style="list-style-type: none"> VAN DER KLOOF ROODEKUIL 2 	-	-	-	-

CSIR NUMBER	DFFE REFERENCE	TECHNOLOGY	MW/KV	STATUS	PROJECT TITLE	EIA REGULATIONS	ASSESSMENT PROCESS	APPLICANT	EAP
Shown on map as Existing HV Lines	• N/A	Transmission Line	220	Existing Power Line	• VAN DER KLOOF ROODEKUIL 1	-	-	-	-
Shown on map as Existing HV Lines	• N/A	Transmission Line	400	Existing Power Line	• BETA HYDRA 1	-	-	-	-
Shown on map as Existing HV Lines	• N/A	Transmission Line	400	Existing Power Line	• HYDRA PERSEUS 2	-	-	-	-
Shown on map as Existing HV Lines	• N/A	Transmission Line	132	Existing Power Line	• KALKBULT/KAREEBOSCHPAN 1	-	-	-	-
Shown on map as Existing HV Lines	• N/A	Transmission Line	132	Existing Power Line	• ROODEKUIL/ORANIA 1	-	-	-	-
Shown on map as Planned HV Lines	• N/A	Transmission Line	765	Planned Power Line	• Perseus to Gamma 2nd 765 kV line • Cape Corridor Phase 4: 2nd Zeus-Per-Gam-Ome 765kV Line	-	-	-	-
Shown on map as Planned HV Lines	• N/A	Transmission Line	765	Planned Power Line	• Relocate Beta-Hydra 765kV line to form Perseus-Hydra 1st 765kV line • Cape Corridor Phase 2: Zeus - Hydra 765kV Integration	-	-	-	-
Shown on map as Planned HV Lines	• N/A	Transmission Line	765	Planned Power Line	• Perseus to Gamma 2nd 765 kV line • Cape Corridor Phase 4: 2nd Zeus-Per-Gam-Ome 765kV Line	-	-	-	-

Proposed Kudu Solar PV facility (1 - 12)
 near De Aar, Northern Cape Province
 South Africa

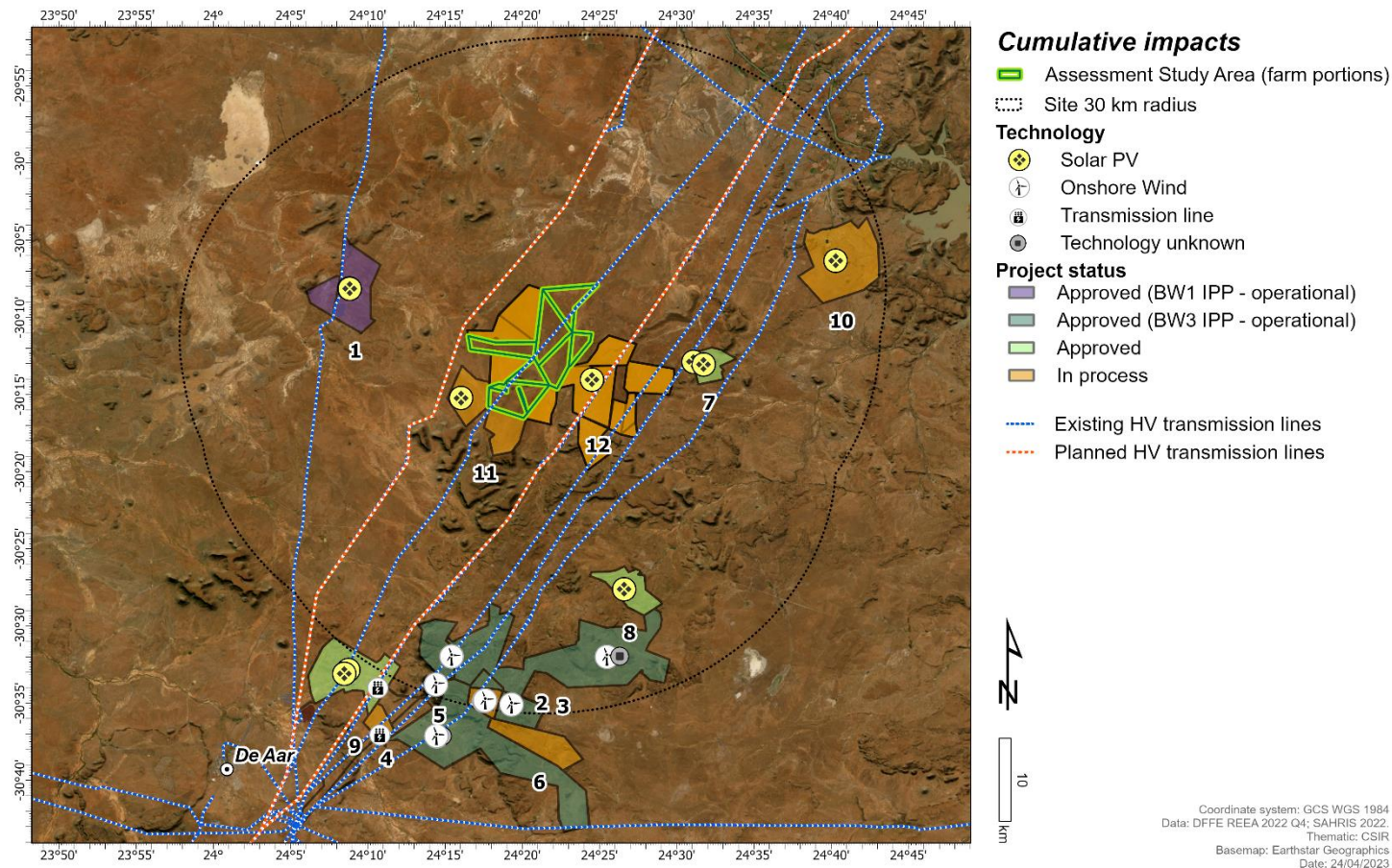


Figure 4.3. Renewable Energy projects within the 30 km radius considered for the Cumulative Impact Assessment (Source: DFFE REEA Quarter 4, 2022; and SAHRIS).

4.10 Terms of Reference for the Specialist Assessments

The specialist studies have been undertaken based on compliance with relevant legislation and based on the Terms of Reference indicated in the Plan of Study for the EIA, i.e. Chapter 7 of the FSR¹², which was accepted in March 2023. The Terms of Reference did not require any update following the 30-day commenting period of the DSR.

The Terms of Reference has also been included in the relevant specialist assessment chapters, i.e., Chapters 6 to 17 of this EIA Report. The results of the specialist assessments and other relevant project information and research undertaken for this proposed project have been integrated into this EIA Report.

The Terms of Reference for the Specialist Assessments essentially consist of the generic assessment requirements and the specific issues identified for each discipline, as captured in the Plan of Study for EIA.

¹² CSIR, 2023. Scoping and Environmental Impact Assessment (EIA) Process for the proposed development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and associated infrastructure, near De Aar in the Northern Cape Province. Final Scoping Report. CSIR Report Number: CSIR/SPLA/SECO/ER/2022/0051/B.



CHAPTER 5: Project Alternatives

CONTENTS

5. APPROACH TO THE ASSESSMENT OF ALTERNATIVES 5-3

5.1 Assessment of Alternatives	5-4
5.1.1 No-go Alternative	5-4
5.1.2 Land-Use Alternatives	5-5
5.1.3 Renewable Energy Alternatives	5-6
5.1.3.1 Biomass Energy	5-6
5.1.3.2 Hydro Energy	5-6
5.1.3.3 Wind and Solar Energy	5-8
5.1.4 Site Alternatives	5-13
5.1.4.1 Site Specific Considerations	5-15
5.1.5 Location Alternatives – Development Footprint within the Preferred Site	5-17
5.1.6 Technology Alternatives	5-20
5.1.6.1 Solar Panel Types	5-20
5.1.6.2 PV Mounting System	5-20
5.1.6.3 Battery Energy Storage Systems	5-20
5.2 Concluding Statement of Preferred Alternatives	5-22
5.3 Summary of Legislative Requirements for the Assessment of Alternatives	5-23

TABLES

Table 5.1: Summary of Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives.	5-12
Table 5.2: Farm portions forming the study area of the Kudu Solar Facilities.	5-13
Table 5.3: Site selection factors and suitability of the preferred site for the development of the proposed project.	5-15
Table 5.4: Advantages and disadvantages associated with the BESS technologies being considered for the proposed project (Sources: ISHECON, 2022, Parsons, 2017; Zhang <i>et al.</i> , 2016).	5-21
Table 5.5: Requirements for the consideration of Alternatives based on the 2014 NEMA EIA Regulations (as amended).	5-24



FIGURES

- Figure 5.1: Solar Resource Availability / Global Horizontal Irradiation (kWh/m²); Annual Mean Wind Power Density (W/m²); Hydropower Potential (kWh/year); and Biomass Potential in terms of Annual Forestry Residue (t/a) for South Africa. The proposed project location is indicated by the black square. _____ 5-7
- Figure 5.2: Total Installed Capacity for 2030 (% of MW) in the IRP of 2019. _____ 5-8
- Figure 5.3: 2019 IRP Allocations for Wind, Solar and CSP in MW. _____ 5-8
- Figure 5.4: Process flow for the identification of the Preferred Site and Development Footprint. _____ 5-19

5. APPROACH TO THE ASSESSMENT OF ALTERNATIVES

This chapter discusses the alternatives that have been considered as part of the Environmental Impact Assessment (EIA) Phase. Sections 24(4) (b) (i) and 24(4A) of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) require an Environmental Assessment to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24O (1)(b)(iv) also requires that the Competent Authority, when considering an application for EA, takes into account “*where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment*”.

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

The 2014 NEMA EIA Regulations (as amended) define “alternatives”, in relation to a proposed activity, “as different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

- property on which or location where the activity is proposed to be undertaken;
- type of activity to be undertaken;
- design or layout of the activity;
- technology to be used in the activity;
- operational aspects of the activity; and
- includes the option of not implementing the activity”.

Appendix 3 of the 2014 NEMA EIA Regulations (as amended) provides the following objectives, *inter alia*, of the EIA Process in relation to alternatives:

- To identify the location of the development footprint within the approved site as contemplated in the accepted scoping report 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; and
- To identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment.

The EIA Report is therefore required to provide a full description of the process followed to reach the proposed preferred activity, technology, site and location of the development footprint within the site, including details of all the alternatives considered and the outcome of the site selection matrix. The details presented in this chapter applies to the Kudu Solar Facility 1 (hereafter referred to as the “Kudu Solar Facility” or “proposed project”).

5.1 Assessment of Alternatives

5.1.1 No-go Alternative

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not developing the proposed solar photovoltaic (PV) facility and associated infrastructure. This alternative would result in no environmental impacts on the site or surrounding local area as a result of the proposed project. It provides the baseline against which other alternatives are compared. The following implications will occur if the “no-go” alternative is implemented (i.e. the proposed project does not proceed):

- No benefits will be derived from the implementation of an additional land-use;
- No additional power will be generated or supplied through means of renewable energy resources by the proposed project at this location;
- The “no go” alternative will not contribute to and assist the government in achieving its renewable energy target of 26 630 MW total installed capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power (CSP)) (Integrated Resource Plan (IRP), 2019);
- Electricity generation will remain constant (i.e. no renewable energy generation will occur on the site for the proposed project) and as a result, the local economy in terms of surrounding communities and towns within the local municipality will not be diversified, while existing electricity generation sources nationally will age and degrade over time, with maintenance requirements potentially leading to outages;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised;
- There will be no opportunity for additional employment in an area, where job creation is identified as a key priority;
- The local economic benefits associated with the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) will not be realised, and socio-economic contribution payments into the local community trust will not be realised;
- The development of solar PV facilities instead of coal fired power stations can directly contribute to South Africa’s response to climate mitigation; and
- Wind and solar energy are the cheapest source of electricity in South Africa, as seen in the REIPPPP Bidding Window 5 Preferred Bidder announcement on 28 October 2021. The development of the proposed Solar PV Facilities can contribute to the competitive nature of the REIPPPP to drive prices down even further to ensure that South Africans have access to affordable yet clean electricity.

Converse to the above, the following benefits could occur if the “no-go” alternative is implemented:

- Only the agricultural land use (livestock farming) will remain;
- No vegetation or protected species (flora) will be removed or disturbed during the development of the proposed project;
- No aquatic resources will be impacted upon during the construction and operation of the proposed project;
- No destruction of habitat will occur;

- No change to the current landscape will occur (i.e. the visual character of the area will remain unchanged);
- No heritage features will be impacted on;
- No noise impacts associated with construction activities will occur;
- No avifaunal impacts will occur due to the establishment of the project;
- No additional traffic will be generated; and
- No additional water use will be required.

The no-go alternative has been considered further by the specialists in the EIA Phase. Refer to the Specialist Assessments captured in Chapters 6 to 17 of this EIA Report for feedback on the no-go alternative. It is important to note that none of the Specialist Assessments have identified any environmental fatal flaws, and no unacceptable residual impacts have been identified.

The no-go alternative means no addition of renewable energy, which means further reliance on fossil fuels that will continue to have a negative environmental impact. While the no-go alternative i.e. not developing the proposed project will not result in any negative environmental impacts in the area, it will also not have any positive community development or socio-economic benefits. In addition, it will not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. **Hence, the no-go alternative is not the preferred alternative, nor is it a reasonable and feasible alternative to be considered in this EIA Process.**

5.1.2 Land-Use Alternatives

According to the Agricultural Compliance Statement, included in Chapter 6 of the EIA Report, the arid climate is the limiting factor for land capability, regardless of the soil capability and terrain. Moisture availability is insufficient for crop production without irrigation and the potential agricultural land use of the study area is therefore limited to grazing. The farm portions forming part of the study area are used for grazing sheep and game. Grazing capacity of the study area is fairly low at 20 hectares (ha) per large stock unit.

The Agricultural Site Sensitivity Verification verifies that the entire study area is classified as low and medium agricultural sensitivity with a land capability value of 5 to 6, which is in line with the climate limitations that make the site totally unsuitable for dryland crop production. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority. The proposed project offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.

Hence, the agricultural land use is not a preferred alternative, and is not deemed as feasible for consideration in the EIA Phase, based on the motivation provided above.

5.1.3 Renewable Energy Alternatives

In terms of the type of activity, this relates to the generation of electricity from a renewable energy source, and in this particular case, from **solar** resources. As indicated in Chapter 1 of this EIA Report, the South African subsidiary of ABO Wind¹ focuses on solar, wind and biogas technologies and works with landowners, technology providers, regulators and investors to source and develop renewable energy projects. Therefore, the **generation of electricity from a renewable energy source** was the only activity considered by the Project Applicant, and thus considered in this Scoping and EIA Process. **No other activity types were considered or deemed appropriate based on the expertise of the Project Applicant, as motivated below.**

Where the “activity” is the generation of electricity from a renewable energy source, possible alternatives that could potentially be considered include Biomass, Hydro Energy, Wind Energy and Solar Energy. However, based on the preliminary investigations undertaken by the Project Applicant, **Solar PV development is the preferred technology alternative** and no other renewable energy technologies are deemed to be feasible for the study area. The unsuitability of other renewable energy technologies in the study area, and impacts of each, are discussed below.

5.1.3.1 Biomass Energy

The proposed project study area does not contain an abundant or sustainable supply of biomass. As indicated in Figure 5.1, the proposed project area has less than 5 000 t/a annual forestry residue, which is the lowest for this category. Therefore, the study area does not have any biomass energy potential.

Therefore, the implementation of a Biomass Energy Facility within the study area is not considered to be a reasonable and feasible alternative for assessment as part of this Scoping and EIA Process.

5.1.3.2 Hydro Energy

The proposed project study area does not contain any large inland water bodies, which excludes the possibility of renewable energy from small- or large-scale hydro energy generation. In terms of macroscale hydropower potential (Figure 5.1), the study area falls within an area classified as “Not Suitable” (i.e. less than 1 000 kWh/year).

Therefore, the implementation of a Hydro Energy Facility within the study area is not considered to be a reasonable and feasible alternative for assessment as part of this Scoping and EIA Process.

¹ ABO Wind renewable energies (Pty) Ltd (hereafter “ABO Wind”) is involved in the development proposal stage, however the responsibility for the actual implementation of the project (should EA and relevant approvals be granted) lies with the Project Developer / Project Applicant (i.e. Kudu Solar Facility 1 (Pty) Ltd).

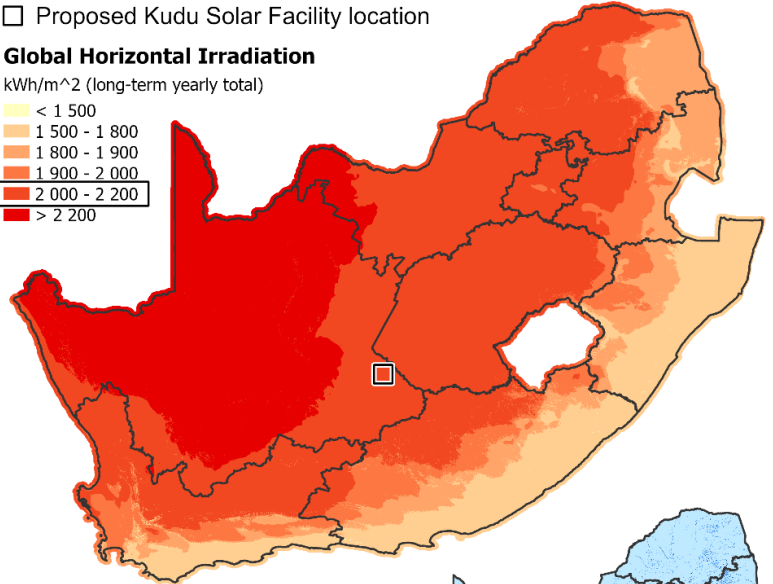
Renewable energy resource potentials

□ Proposed Kudu Solar Facility location

Global Horizontal Irradiation

kWh/m² (long-term yearly total)

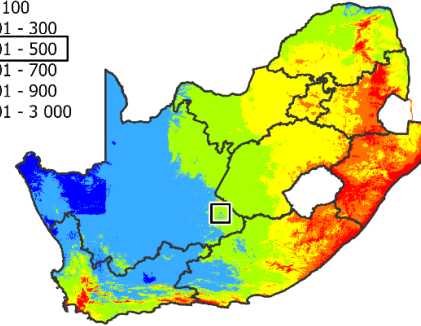
- < 1 500
- 1 500 - 1 800
- 1 800 - 1 900
- 1 900 - 2 000
- 2 000 - 2 200
- > 2 200



Mean Wind Power Density

W/m²

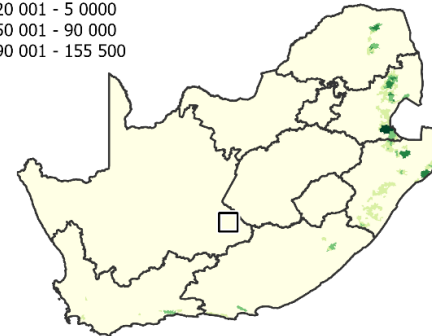
- < 100
- 101 - 300
- 301 - 500
- 501 - 700
- 701 - 900
- 901 - 3 000



Annual forestry residue biomass

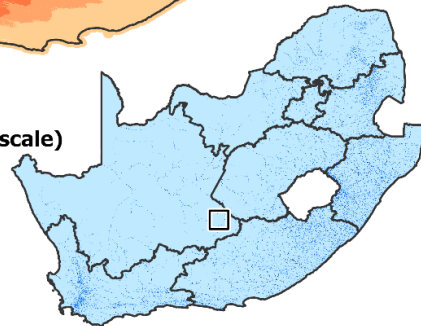
(t/a)

- < 5 000
- 5 001 - 20 000
- 20 001 - 50 000
- 50 001 - 90 000
- 90 001 - 155 500



Hydro power suitability (macro-scale)

- Not suitable (< 1 000 kWh/yr)
- Poor (1 000 - 10 000 kWh/yr)
- Acceptable (10 000 - 30 000 kWh/yr)
- Good (30 000 - 100 000 kWh/yr)
- Excellent (> 100 000 kWh/yr)



Thematic: CSIR | Data: SolarGIS, 2019; CSIR & DTU, 2019; CSIR, 1999; SAEON, 2013 | Date:01/12/2022

Figure 5.1: Solar Resource Availability / Global Horizontal Irradiation (kWh/m²); Annual Mean Wind Power Density (W/m²); Hydropower Potential (kWh/year); and Biomass Potential in terms of Annual Forestry Residue (t/a) for South Africa. The proposed project location is indicated by the black square.

5.1.3.3 Wind and Solar Energy

5.1.3.3.1 National Planning: IRP 2019

The 2019 IRP was published in Government Gazette (GG) 42784, Government Notice (GN) 1360 on 18 October 2019 for the period 2019 to 2030. As indicated in Figure 5.2 for the projection to 2030, coal makes up approximately 43 % of the total installed capacity, whereas Wind and Solar PV respectively make up 23 % and 10 % (Table 5, Page 42 of the IRP 2019 published in GG 42784).

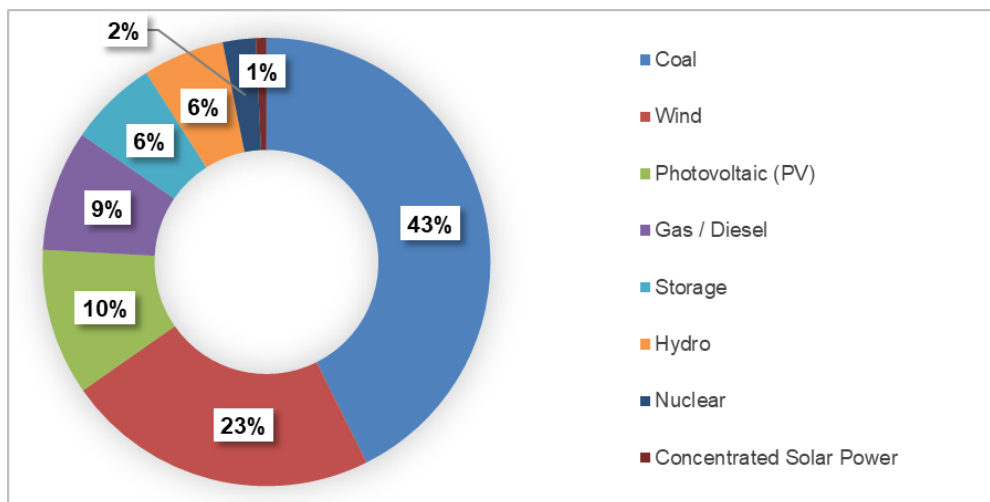


Figure 5.2: Total Installed Capacity for 2030 (% of MW) in the IRP of 2019.

The 2019 IRP proposes to secure 26 630 MW of renewable energy capacity by 2030 (for Wind, Solar PV and CSP). This amount excludes Hydropower and Storage. Of this total, 1 474 MW of Solar PV, 1 980 MW of Wind and 300 MW of CSP is already installed capacity. In addition, of the 26 630 MW, approximately 814 MW of Solar PV, 1 362 of Wind and 300 MW of CSP is committed or already contracted capacity. Furthermore, of the 26 630 MW total, 6 000 MW is allocated to Solar PV, and 14 400 MW is allocated to wind as new additional capacity. Refer to Figure 5.3 for additional information.

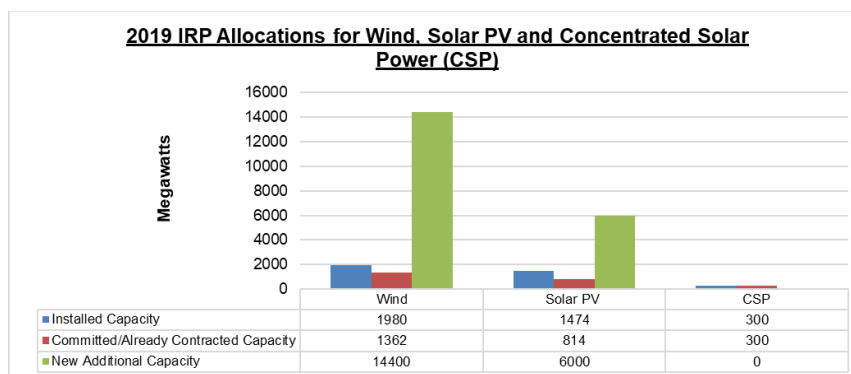


Figure 5.3: 2019 IRP Allocations for Wind, Solar and CSP in MW.

As part of the rollout of renewable energy in the country, the Department of Mineral Resources and Energy (DMRE) developed a bidding process for the procurement of a set amount (MW) of renewable energy in accordance with the IRP from Independent Power Producers (IPPs). The REIPPPP was launched in 2011 to implement the vision of the IRP and it included several bidding rounds (called “Bidding Windows”). To date, Bidding Windows 1, 2, 3, 3.5, 4, 5 and 6 have been announced. It is understood that Bid Window 7 will be open in 2023 to potentially procure 5000 MW (DMRE, 2023²).

On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in GN 733, GG 39111. Of this, the additional target allocated for solar PV was 2 200 MW.

On 28 October 2021, the Minister of Mineral Resources and Energy (DMRE, 2021a³) announced the Preferred Bidders of Bid Window 5 of the REIPPPP, which was released in April 2021. The aim was to procure a total of 2 600 MW (consisting of 1 600 MW from onshore wind and 1 000 MW from Solar PV). Approximately 102 Bids were submitted in August 2021. Twenty-five (25) Preferred Bidder Projects, totalling 2 583 MW, were selected (DMRE, 2021a¹). Of the 2 583 MW, approximately 1 608 MW and 975 MW will be respectively procured from 12 wind projects and 13 Solar PV projects (DMRE, 2022a⁴). In Bid Window 5, the Preferred Bidders provided an average tariff of 50 c/kWh for wind and of 43 c/kWh for solar PV. This is a considerable reduction in tariff from Bid Window 4 in November 2015 where the tariff provided for wind and solar PV were both 78 c/kWh. This confirms the crucial role that renewable energy is playing in being the lowest cost energy alternative in South Africa, while supporting the decarbonisation of the power system and ensuring that electricity is cost-effective and sustainable.

According to the IPP Office, in a presentation made at the Bid Window 6 Bidders’ Conference on 7 July 2022 (IPP Office, 2022b⁵), as of March 2022 (excluding Bid Window 5 statistics), the DMRE had selected 92 Preferred Bidders, with a total combined electricity capacity of 6 323 MW procured, of which 5 826 MW is already operational from 87 IPPs.

Bid Window 6 was announced in April 2022 and closed on 3 October 2022, and will aim to procure 4200 MW (i.e. 3 200 MW from wind and 1 000 MW from Solar PV). Six preferred bidders for Solar PV projects have been announced for Bid Window 6.

On 7 July 2020, in GG 43509, GN R753, the Minister of Mineral Resources and Energy, in consultation with the National Energy Regulator of South Africa (NERSA), determined that new generation capacity needs to be procured to contribute towards energy security. Specifically, the gazette noted that 2000 MW needs to be procured from a range of energy source technologies in

² DMRE (2023). Minister Gwede Mantashe: Mineral Resources and Energy Dept Budget Vote 2023/24 NCOP. <https://www.gov.za/speeches/minister-gwede-mantashe-national-council-provinces-mineral-resources-and-energy-dept-budget> [online]. Accessed May 2023.

³ DMRE (2021a). Announcement by the Minister of Mineral Resources and Energy, the Honourable Gwede Mantashe 28 October 2021 Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 Announcement of Preferred Bidders. <https://ipp-projects.co.za/PressCentre> [online]. Accessed November 2021.

⁴ DMRE (2022a). Media Statement by the DMRE: Signing of an additional three project agreements under the 5th Bid Window of the Renewable Energy Independent Power Producer Programme (REIPPPP BID WINDOW 5), dated 10 November 2022. <https://ipp-projects.co.za/PressCentre> [online]. Accessed November 2022.

⁵ IPP Office (2022b). Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) Bid Window 6 Bidders’ Conference dated 7 July 2022. <https://ipp-projects.co.za/PressCentre> [online]. Accessed August 2022.

accordance with the short-term risk mitigation capacity allocated for the years 2019 to 2022 (under “other” in the allocation table contained in 2019 IRP). In line with this, the Risk Mitigation IPP Procurement Programme (RMIPPPP) was designed and launched in August 2020 by the DMRE in order to fulfil the GN R753 Ministerial Determination. Bids were submitted by various IPPs on 22 December 2020, and on 18 March 2021, the Minister of Mineral Resources and Energy, announced eight Preferred Bidders selected under the RMIPPPP, totalling 1 845 MW (DMRE, 2021b⁶). Three additional Preferred Bidder projects were also announced on 1 June 2021 under the RMIPPPP with a combined capacity of 150 MW, resulting in a total of approximately 1 995 MW to be procured under the RMIPPPP (DMRE, 2021c⁷).

As indicated in Chapter 2 of this EIA Report, the proposed project forms part of a cluster of 12 Solar PV Facilities, which will each have a generation capacity that ranges from 50 MWac to 350 MWac. **It is intended for these projects to be bid under the future rounds of the REIPPPP or similar bidding processes, following the issuing of Environmental Authorisations (EAs), should such be granted.**

5.1.3.3.2 Wind Energy

In order to ensure that a Wind Energy Facility is successful, a reliable wind resource is required. Wind resource is defined in terms of average wind speed and includes Weibull distribution (used to describe wind speed distributions); turbulence, wind direction, and pattern of wind direction (as depicted by a wind rose). These factors are all key considerations used in determining whether a site is suitable for the development of a Wind Energy Facility. A mean wind power density map has been created (CSIR, 2018), which is not related to any specific turbine type and demonstrates the wind resource of the country. The mean wind power density map shows that the project study area falls within an area of approximately 301 – 500 W/m² (Figure 5.1).

Overall, wind energy development can occur within this area but other localities in South Africa may be more favourable for such development. Site specific requirements for **Wind Energy Facilities** however make this proposed project study area a **less feasible alternative** when compared to solar PV.

The Avifauna Specialist Assessment (Chapter 9 of the EIA Report) notes that a suspected Verreaux’s Eagle nest is present on the Hydra - Perseus 1 765 kV high voltage line within the study area for the proposed project. The Avifauna Specialist has recommended a 1 km all infrastructure exclusion zone around this nest to prevent the displacement of the breeding pair during the construction phase due to disturbance. In addition, the buffer area will reduce the risk of injury to the juvenile bird due to collision with the solar panels, when it starts flying and practicing its hunting technique around the nest. This buffer is in relation to the development of a solar PV project. For a proposed wind development, the buffer around this nest would be greater. According to the Avifauna Specialist, the wind energy buffers for Verreaux’s Eagle are generally 3.7 km for a turbine exclusion zone, and 5.2 km buffer for medium sensitivity, wherein mitigation is required.

⁶ DMRE (2021b). Media Statement: To Announce Preferred Bidders for the Risk Mitigation IPP Procurement Programme (RMIPPPP). <https://www.dmr.gov.za/news-room/post/1894/media-statement-to-announce-preferred-bidders-for-the-risk-mitigation-ipp-procurement-programme-rmipppp> [online]. Accessed November 2021.

⁷ DMRE (2021c). Media Statement: Department of Mineral Resources and Energy Announces Three Additional Preferred Bidders Appointed under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). <https://www.ipp-rm.co.za/> [online]. Accessed November 2021.

Alternatively, a Verreux's Eagle Risk Assessment (VERA) would be required for the wind energy development in order to inform the layout, and the results could be more restrictive.

Therefore, it is understood that the development of wind energy within the study area would most likely result in impacts that are more difficult to manage and that there would be limited space available based on Very High sensitivities relating to avifauna. Furthermore, one of the aims is to try and receive EA (should it be granted) as promptly as possible in order to ensure the project is bid in the next bidding windows of the REIPPPP or similar tender processes; and development of Wind Energy Facilities would need at least 12 months of pre-construction monitoring for birds and bats. In addition, for wind energy developments, collecting on-site wind data is necessary to confirm both the presence of the wind resource on site and the bankable viability of the proposed project. The provision of at least 12 months on-site wind monitoring data is also a requirement of the REIPPPP. The timelines for these monitoring programmes are not favourable to the overall current project schedule.

Therefore, the implementation of a Wind Energy Facility within the proposed project study area is not considered to be a feasible alternative for assessment as part of this current Application for EA. However, it is possible for ABO Wind to pursue this technology in the future and undertake detailed environmental screening to determine if it is feasible.

5.1.3.3.3 Solar Energy

In terms of the suitability of solar energy development at this location, the proposed project study area falls within the **second highest** Global Horizontal Irradiation⁸ (GHI) category, relevant to PV installations (Figure 5.1). As indicated in Figure 5.1, the study area has a GHI of 2 000 kWh/m² to 2 200 kWh/m² in terms of the long-term yearly total.

Therefore, this area is deemed as one of the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within the Eastern Cape and Western Cape mainly have a lower GHI (shown in the lighter orange shades in Figure 5.1), which is not completely feasible for the proposed project. It is important to note that there are three operational PV facilities, that received Preferred Bidder status, located within 30 km of the proposed project study area; and there are several other approved PV projects within the 30 km radius as indicated in Chapter 4 of this EIA Report. Furthermore, as indicated in the earlier discussion on the outcomes of Bid Window 5 in October 2021, solar PV is currently the least cost energy generation option for South Africa. These factors substantiate that use of solar resources in the area is extremely viable and support the development of Solar PV within the proposed project study area.

Therefore, the implementation of a solar energy facility within the study area is more favourable and feasible than wind energy, biomass and hydropower development, especially from a project economic and energy generation viability and location compatibility perspective. Therefore, the proposed Solar PV Facility is the most feasible and preferred Renewable Energy Alternative.

⁸ Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground.

Finally, since the alternative renewable energy generation activities considered were deemed to be unreasonable and unfeasible for the study area, no other Renewable Energy alternatives were further assessed as part of the Scoping and EIA Process.

5.1.3.3.4 Summary of the Renewable Energy Alternatives

Table 5.1 presents a summary and an evaluation matrix for the possible renewable energy alternatives with regards to resource suitability and availability, and potential risks and impacts.

Table 5.1: Summary of Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives.

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site?	Main Potential Impacts and Risks	Is this the preferred Alternative?
Biomass Energy	<ul style="list-style-type: none"> No – not suitable i.e. less than 5 000 t/a annual forestry residue. 	<ul style="list-style-type: none"> Significant Waste Generation with the potential need for a Waste Management Licence; and Air Emissions with the potential need for an Atmospheric Emissions Licence. 	<ul style="list-style-type: none"> No
Hydro Energy	<ul style="list-style-type: none"> No – “Not Suitable” (i.e. less than 1 000 kWh/year) 	<ul style="list-style-type: none"> Significant impacts on aquatic biodiversity and hydrology of the affected river system; Water Use Licence would be required for the establishment of an in-stream hydropower development; and Long lead times would be required for the various permits needed for such development. 	<ul style="list-style-type: none"> No
Wind Energy	<ul style="list-style-type: none"> Yes, but other sites might have better wind resources - 301 – 500 W/m² 	<ul style="list-style-type: none"> Visual impacts as a result of construction activities and turbines during operation; Noise generation as a result of construction activities and turbines during operation; Bird and bat collisions during the operational phase; More restrictive buffers due to Verreaux's Eagle, Cape Vulture, and White-backed Vulture (which were recorded during the site monitoring); Impacts on aquatic ecology and terrestrial ecology; Impact on archaeology and palaeontology; and Impact on Civil Aviation due to nearby aerodromes. 	<ul style="list-style-type: none"> No
Solar Energy	<ul style="list-style-type: none"> Yes – 2 000 - 2 200 kWh/m² 	<ul style="list-style-type: none"> Visual impacts as a result of construction activities and the PV panels during operation; Noise generation as a result of construction activities; Loss of agricultural land (i.e. grazing); Impacts on heritage resources (i.e. archaeology and palaeontology); Impacts on the water balance as a result of water required for panel cleaning; Impacts on avifauna, aquatic ecology and terrestrial ecology. 	<ul style="list-style-type: none"> Yes

5.1.4 Site Alternatives

The 2014 NEMA EIA Regulations (as amended) requires a site selection matrix to be provided to show how the preferred site was determined through a site selection process. Within this context, the “site” is the farms or land portions earmarked for the development of the proposed project. This is essentially the proposed project study area, which consists of farm portions indicated in Table 5.2. The total study area for all the Kudu Solar Facilities is approximately 8 150 ha.

Table 5.2: Farm portions forming the study area of the Kudu Solar Facilities.

FARM PORTION	SG CODE
Remaining Extent of the Farm Bas Berg No. 88	C05700000000008800000
Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	C05700000000008800003
Portion 4 (Portion of Portion 3) of the Farm Bas Berg No. 88	C05700000000008800004
Remaining Extent of Portion 2 (Middel Plaats) (a Portion of Portion 1) of the Farm Grasspan No. 40	C05700000000004000002
Remaining Extent of the Farm Annex Wolve Kuil No. 41	C05700000000004100000
Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41	C05700000000004100001
Portion 2 of the Farm Wolve Kuil No. 43	C05700000000004300002
Remaining Extent of the Farm Wolve Kuilen No. 42	C05700000000004200000

The preferred site (i.e. study area) was strategically selected by the Project Developer based on various factors and detailed research, as noted below:

- As an initial step, the Project Developer undertook internal research, exploration work, and a desktop feasibility analysis (based on the grid connection options, solar resource and land availability) in order to identify the preferred site.
- The Project Developer then consulted the National Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool and other available datasets, such as the Northern Cape Critical Biodiversity Area (CBA) map, and the South African National Biodiversity Institute (SANBI) Biodiversity GIS (BGIS) system, as well as the Endangered Wildlife Trust (EWT) No-Go Screening Tool, in order to identify desktop environmental sensitivities and to determine if there are any fatal flaws and concerns. The findings indicated that the study area is generally developable.
- The Project Developer then consulted with the owners of the farm portions forming the study area to obtain consent to develop the proposed project, and to also identify any areas where development must be excluded based on the requirements of the landowners. These landowner exclusion zones were then acknowledged and implemented, which influenced the site selection process.
- The Project Developer also considered adjacent farm portions and approached the landowners; however, this exercise was unsuccessful as the land had already been secured by other developers.
- The study area falls inside the Central Strategic Transmission Corridor that was gazetted in GN 113 of 16 February 2018, which allows for streamlining of the Environmental Assessment for Electricity Grid Infrastructure (EGI) development within the corridor, whereby a Basic Assessment and 57 days decision-making can be followed, instead of a full Scoping and EIA

with 107 days decision-making. In addition, the EGI Standard was published on 27 July 2022, in GG 47095; GN 2313, which allows for the exclusion from an Environmental Assessment for EGI development within the gazetted corridors in low and medium sensitivity areas. Should the EGI Standard apply, then the development for the EGI components of the project would only be subjected to a registration process with a decision-making of 30 days. This benefit was considered very significant by the Project Developer, and therefore obtaining a site within any of the gazetted Strategic Transmission Corridors was focused on.

- The Eskom Transmission Development Plan (TDP) 2022 – 2031 (Eskom, 2022⁹) notes that the Hydra B 400/132 kV Substation, a new substation, is required in the Northern Cape over the current TDP period. The Hydra B Substation is proposed to be located “approximately 50 km from the existing Hydra Substation along the Hydra-Perseus 400 kV line” (Eskom, 2022, Page 115). Eskom also confirmed that the proposed location of the Hydra B Substation falls within the EGI Corridor to be separately assessed as part of Projects 13 – 26. Refer to Chapter 1 of this EIA Report for additional feedback in this regard. Therefore, since the proposed Hydra B Substation is planned to be constructed in the same area, this makes a potential connection opportunity available. This is considered a significant benefit for the Project Developer, as grid connection is an important factor.
- It was also important for the site to be located outside of the Karoo Central Astronomy Advantage Area (KCAAA) so that there are no unacceptable impacts on the Square Kilometre Array (SKA), which could potentially be a fatal flaw or require significant investment in Radio Frequency Interference and Electromagnetic Control studies to be undertaken.

At a local level, the affected farm portions for the development of the proposed project were selected based on a combination of the factors listed above. Furthermore, from an impact and risk assessment perspective, the implementation of the proposed project at the **preferred site** will most likely result in fewer risks in comparison to its implementation at alternative sites within the Northern Cape (i.e. regions with similar solar radiation levels), based on the following points:

- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example, the agricultural potential at the alternative sites might be higher and of greater significance.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility on their land and if the landowners strongly object, then the project will not be feasible.
- There is no guarantee that other sites will be located close to existing or proposed EGI to enable connection to the national grid. The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

⁹ Eskom (2022). Eskom Transmission Development Plan: 2022 – 2031. Available online: <https://www.eskom.co.za/wp-content/uploads/2022/03/TDP2022-2031Rev1.pdf>. Accessed September 2022.

5.1.4.1 Site Specific Considerations

As indicated above, the preferred site for the proposed project extends over the farm portions indicated in Table 5.2.

On a site specific level, the preferred site was deemed suitable due to all the site selection factors (such as land availability, environmental sensitivities, irradiation levels, distance to the national grid, site accessibility, topography, current land use and landowner willingness) being favourable. The site selection criteria considered by ABO Wind are discussed in detail below in Table 5.3.

Table 5.3: Site selection factors and suitability of the preferred site for the development of the proposed project.

FACTOR	SUITABILITY OF THE PREFERRED SITE
Land Availability	The farm portions comprising the preferred site are of a suitable size for the proposed project. The land available for the development of all the proposed projects is approximately 8 150 ha in extent. Although this total area was assessed by the specialists during the site verifications and have been further assessed during the EIA Phase, only approximately 141 ha (on average) will be required for the permanent development footprint of the proposed project and its associated infrastructure.
Environmental Sensitivity	Although the preferred site for the proposed project does contain environmental features that need to be avoided due to very high or high environmental sensitivity, as described in the relevant chapters of this EIA Report, following these exclusions sufficient suitable land is still available to ensure the development feasibility of the project (see Section 5.1.5 below).
Irradiation Levels	The availability of the solar resource is the main driver of project viability. The project site was identified by the Project Developer through a desktop analysis based on the estimation of the solar energy resource, and other factors. This viable solar resource ensures the best value for money is gained from the project, allowing for competitive pricing and maximum generation potential, with the resulting direct and indirect benefits for the South African economy. The study area has a GHI of 2 000 to 2 200 kWh/m ² in terms of the long-term yearly total.
Distance to and availability of the Grid	The proposed project is planned to connect to the existing Hydra-Perseus 400 kV overhead power line via a dedicated proposed 132 kV power line and an independent Main Transmission Substation (MTS). However, if the proposed Eskom Hydra B Substation is built by Eskom, then additional upgrades of this Eskom substation would be undertaken to ensure that the substation can accommodate the power generated by the proposed 12 Kudu Solar Facilities. Separate Basic Assessment (BA) and/or EGI Standard Registration Processes will be undertaken for the EGI Projects (Projects 13 – 26). Eskom has confirmed that the proposed Hydra B Substation is located within the EGI corridor that will be assessed and considered separately as part of Projects 13 – 26.
Site Accessibility	<p>The proposed project site can be accessed via the following roads:</p> <ul style="list-style-type: none"> ▪ Divisional Road 3084 (DR 3084); ▪ Divisional Road 3093 (DR 3093); ▪ Divisional Road 3096 (DR 3096); ▪ Trunk Road 38/1 (TR 38/01) (R48); ▪ Trunk Road 38/2 (TR 38/02) (R48); and ▪ Main Road 790 (MR 790) (R388). <p>Refer to the Traffic Impact Assessment (Chapter 14 of the EIA Report) and Chapter 2 of the EIA Report for additional information on the route options per project. Note that these route options are not alternatives for comparison in terms of the EIA Regulations; but rather</p>

FACTOR	SUITABILITY OF THE PREFERRED SITE
	<p>an indication that investigations of all possible options have been taken by the traffic specialist and Project Applicant.</p> <p>An island at the intersection of the DR 3903 and TR 38/01 will need removal and upgrading in order to accommodate the turning movement of the trucks. Details of this has been provided in Chapter 2, Chapter 4 and the Traffic Impact Assessment (Chapter 14 of the EIA Report).</p> <p>Internal service roads will also be constructed within the footprint of the PV facility (extending up to 5 m wide), and from the nearest existing road to the PV facility (extending up to 8 m wide).</p>
Topography	<p>The Visual Impact Assessment (Chapter 10 of this EIA Report) notes that the study area lies within an expansive flattish landscape, composed of Ecca Group shales, interspersed with dolerite-capped koppies, which are the main scenic features of the area and provide topographic relief. The elevation ranges from 1000 to 1500 m in the region.</p>
Current Land Use	<p>Agriculture (mainly low-density livestock grazing)</p>
Landowner Willingness	<p>All affected landowners have signed letters of consent for the use of the land for the proposed project (should an EA be granted). This is considered an important aspect of the proposed project in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowner is willing and supportive of the proposed project being undertaken on the affected farm portions).</p>

Furthermore, the proposed project forms part of a large cluster of 12 Solar PV projects. The main determining points for the Project Developer was to find suitable, developable land in one contiguous block to (i) optimize design, (ii) minimize construction and operational costs, and (iii) minimize sprawling development and limit the impact footprints. In addition, the proximity to the proposed Eskom Hydra B Substation, as well as existing Eskom 400 kV power lines, was also a major determinant for identifying suitable sites for the proposed development.

In order to submit a bid in terms of the REIPPPP, the proponent is required to have obtained an EA in terms of the EIA Regulations as well as several additional authorisations or consents. It is important to note that the National Department of Environmental Affairs (DEA) in discussion with the Department of Energy (DoE) (now respectively operating as the DFFE and DMRE), was mandated by MinMec to commission a Strategic Environmental Assessment (SEA) to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Phase 1 Wind and Solar PV SEA¹⁰ was completed in 2015, and was in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. Similarly, the Phase 2 Wind and Solar SEA was commissioned in 2017 and completed in 2019. The SEA aimed to identify strategic geographical areas best suited for the roll-out of large scale wind and solar PV energy projects, referred to as Renewable Energy Development Zones (REDZs). Through the identification of the REDZs, the key objective of the SEA was to enable strategic planning for the development of large scale wind and solar PV energy facilities in a manner that avoids or minimises significant negative impact on the environment while being commercially attractive and yielding the highest possible social and economic benefit to the country – for example through strategic investment to lower the cost and reduce timeframes of grid access. Following the completion of the Phase 1 Wind and Solar SEA, eight REDZs were gazetted in

¹⁰ More information on the SEA can be accessed at <https://redzs.csir.co.za>

February 2018 in GN 114 by the Minister of Environmental Affairs. In addition, following the completion of the Phase 2 Wind and Solar SEA, three REDZs were gazetted in February 2021 in GN 144 by the Minister of Forestry, Fisheries and the Environment.

The proposed project is located approximately 120 km away (at its closest point) from the Kimberley REDZ. While the proposed project is not located within the REDZ, it still indeed supports the development of a large-scale renewable energy project at the proposed location. The proposed project is linked to the national planning vision for Renewable Energy development in South Africa.

Given the site selection requirements associated with solar energy facilities and the suitability of the land available on the **preferred site**, and the fact that no initial fatal flaws are present on the site, as well as the motivating factors listed above, **no other site alternatives were considered as part of this Scoping and EIA Process. Therefore, the site is deemed feasible and selected as the preferred site.**

5.1.5 Location Alternatives – Development Footprint within the Preferred Site

The strategic process followed to reach the preferred site and to consider various development footprints (or location alternatives) within the preferred site are discussed in this section and illustrated in Figure 5.4. The approach followed is to use environmental and social constraints to avoid sensitive features, thus applying mitigation hierarchy thinking. This approach replaces the need to rank alternative sites and locations, as it leads to the selection of the least sensitive development footprint. Refer to Chapter 2 of this EIA Report for additional information in this regard, specifically the progression from the study area / preferred site to the buildable areas and development footprint.

Once the preferred site was identified, the Project Developer then determined the **Original Scoping Buildable Areas** based on the high-level environmental screening. Following this, the Environmental Assessment Practitioner (CSIR) and Specialists were appointed by ABO Wind to undertake the Scoping and EIA Processes for the Kudu Solar Facilities.

The specialists then undertook the Scoping Level Specialist Assessments, and site sensitivity verifications, where necessary. The specialists assessed the full extent of the preferred site (i.e. approximately 8 150 ha), which serves as the Study Area for this Scoping and EIA Process. The specialists also provided feedback on the Original Scoping Buildable Areas. The Scoping Level Specialist Assessments resulted in the determination and verification of environmental sensitivities present on the preferred site.

Based on the findings of the Scoping Level Specialist Assessments, the **Original Scoping Buildable Areas** were revised in order to avoid the sensitivities identified. This resulted in the identification of the **Revised Scoping Buildable Areas**. Overall, the entire site / study area, and thus all identified buildable areas were assessed by the specialists.

Based on the above, environmental feature and sensitivity maps were produced during the Scoping Phase. These maps showed the identified environmental features and sensitivities such as terrestrial biodiversity, aquatic features, avifauna, heritage, visual, and geohydrological features present within the study area and buildable areas.

At the end of Scoping, the no-go or very highly sensitive environmental features found within the preferred site were avoided by the location, layout and design of the proposed project. Following the exclusion of the required areas, sufficient developable area is still available on site which does not compromise the current ecological integrity of the site.

The layout or location of the development footprint of the proposed project has been refined / finalised during the EIA Phase. This led to identification of the development footprints within the investigated buildable areas, as well as a layout plan of the proposed project, which is shown in Chapter 2 of the EIA Report. The current layout and **Buildable Areas / development footprints** are thus a culmination of extensive technical, economic and environmental planning. Refer to Chapter 3, the specialist studies in Chapters 6 to 17, and Chapter 20 of this EIA Report for feedback on the relevant sensitivities identified.

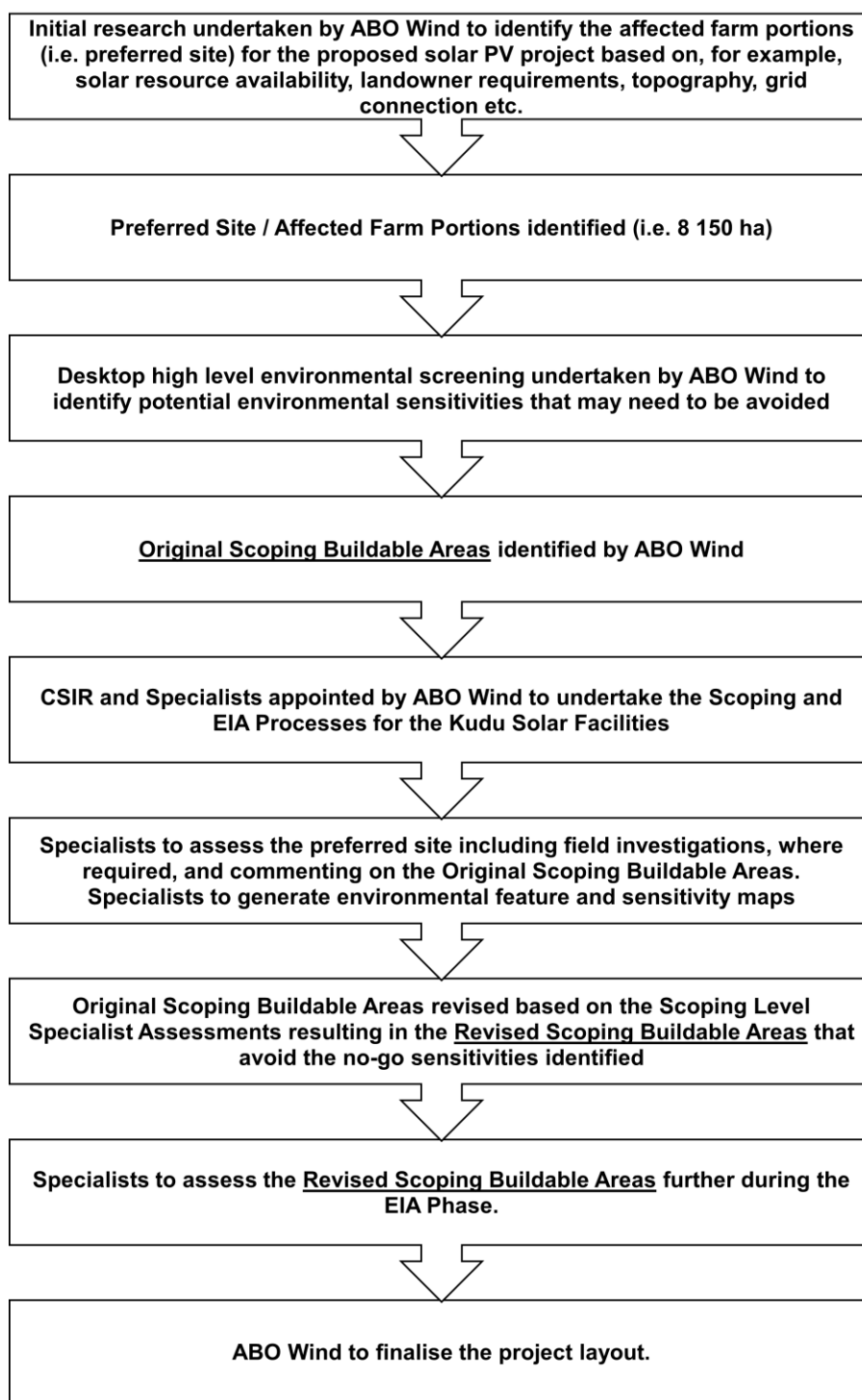


Figure 5.4: Process flow for the identification of the Preferred Site and Development Footprint.

It must be re-iterated that a strategic site, location and development footprint identification process has been followed, where the selection is informed by the environmental constraints identified through screening. This is based on the mitigation hierarchy approach of firstly trying to avoid impacts through careful siting. Therefore, it must be noted that different site, location or development footprint alternatives are not ranked, but rather a strategic process was followed (as

shown in Figure 5.4) where sensitive features are screened out, such as in Table 5.3, in order to reach the preferred location or development footprint within the preferred site.

5.1.6 Technology Alternatives

The following technology alternatives were considered as part of this Scoping and EIA Process.

5.1.6.1 Solar Panel Types

Only the PV solar panel technology type has been considered in this Scoping and EIA Process (i.e. no other technology types considered in this regard). Due to the scarcity of water in the proposed project area and the large volume of water required for CSP, this technology is not deemed feasible or sustainable and has not been considered in this Scoping and EIA Process. This is the main difference between PV and CSP technology that led to the selection of PV as the preferred solar panel technology.

Furthermore, CSP technology requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective. As described above, in terms of the 2019 IRP, 300 MW capacity is already installed for CSP; and an additional 300 MW has been allocated for 2019, whilst there is no new additional capacity allocated for this technology. Solar PV is allocated an additional new capacity of 6 000 MW in terms of the 2019 IRP. This means that the need and desirability of CSP is not as evident and justified compared to PV.

5.1.6.2 PV Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The main mounting systems considered as part of the Scoping and EIA Process and design are Single Axis Tracking structures (aligned north-south); Dual Axis Tracking (aligned east-west and north-south); Fixed Tilt Mounting Structure; Mono-facial Solar Modules and Bifacial Solar Modules.

Note that the mounting options are not weighed against each other in order to identify the most preferred alternative at the end of the EIA Phase. Instead, the specialists have assessed all of the above mounting systems, and thus all are put forward for approval in the EA (should it be granted). Regardless of the mounting system, the maximum height of the PV panel structure has been assessed by the specialists and will not be exceeded.

5.1.6.3 Battery Energy Storage Systems

As indicated in Chapter 2 of this EIA Report, two alternative technologies have been considered in the Scoping and EIA Process, i.e. Solid State Battery Energy Storage Systems (BESS) (typically Lithium technology) and Redox Flow BESS (typically vanadium chemistry). The technology is advancing rapidly, and the exact chemistry will be chosen during the Engineering, Procurement and Construction (EPC) phase. Refer to Chapter 15 of this EIA Report for a High-Level Safety, Health and Environment Risk Assessment, which provides high level information on the safety, health and environmental risks of the BESS technologies being considered. Table 5.4 provides high level advantages and disadvantages of the two technologies.

Table 5.4: Advantages and disadvantages associated with the BESS technologies being considered for the proposed project (Sources: ISHECON, 2022, Parsons, 2017¹¹; Zhang *et al.*, 2016¹²).

BESS technologies being considered	Advantages	Disadvantages
<u>Solid State Lithium-ion BESS</u>	<ul style="list-style-type: none"> ▪ Sealed systems i.e. pre-assembled off site and delivered to site for placement (i.e. carries less potential risk to the environment in terms of spillages). Hence, they are easier to install and will not likely need many permanent staff. ▪ Reduced risk of spillage as storage of large quantities of electrolyte is not required. 	<ul style="list-style-type: none"> ▪ Explosions and fires can occur as well as the possibility of generating noxious smoke under these circumstances. This can occur as result of electrolytes mixing when a breach occurs due to: <ul style="list-style-type: none"> - improper maintenance near operating temperature, - thermal expansion, or - freeze thaw cycles. ▪ Over the long term, these BESS may be more difficult to repurpose / dispose of and may present cumulative long term environmental impacts.
<u>Redox Flow Batteries (RFB)</u>	<ul style="list-style-type: none"> ▪ RFBs are self-discharging systems therefore generally require little maintenance. However, RFBs are more difficult to install, i.e. formal brick and mortar structures, and will potentially require many permanent staff. ▪ High economic efficiency, for example, Vanadium has a high economic value and can be recycled. 	<ul style="list-style-type: none"> ▪ Risk of spillage tends to be higher for RFB as opposed to sealed solid-state BESS as the storage tanks of RFB, may be subjected to leaks or spills during the replacement or blending of the electrolyte, or during transport of the battery to and from site.

Note that the specialists have assessed both BESS technologies. The original proposed plan was, if both technologies are deemed acceptable, to motivate to the DFFE in the EIA Phase that both options be considered for approval in the EA (should it be granted). However, the DFFE requested, as part of their acceptance of the Final Scoping Report, that one preferred technology must be selected during the EIA Phase. All the specialists have confirmed and assessed that both BESS technologies are acceptable, as noted in Chapters 6 to 17 of this EIA Report. **Nevertheless, the preferred technology has been selected and confirmed in Chapter 20 of this EIA Report (Conclusions and Recommendations).** The relevant listed activities have been addressed in the Amended Application for EA, as applicable.

¹¹ Parsons, 2017. US Trade and Development Agency. South Africa Energy Storage Technology and Market Assessment. Order Number: TDA-IE201511210. USTDA Activity Number: 2015-11032A. Parsons Job Number: 640368.

¹² Zhang, X., Tang, Y., Zhang, F., and Lee, C. S., (2016). A novel aluminium–graphite dual-ion battery. *Advanced energy materials*, 6(11), p.1502588.

5.2 Concluding Statement of Preferred Alternatives

As per Appendix 3, Section 3 (1) (h) (x) of the 2014 NEMA EIA Regulations (as amended), and based on Section 5.1 above, the following alternatives were addressed in the EIA Phase. This serves as a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report:

- **No-Go Alternative:**

- The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Kudu Solar Facility. This alternative would result in no environmental impacts (positive and negative) on the preferred site or surrounding local area, as a result of the proposed project. The no-go alternative has been assessed in detail by all the specialists on the project team during the EIA Phase. **At this EIA Phase, the no-go alternative is not preferred.**

- **Land-Use Alternative:**

- The current land-use is agriculture, specifically low density small stock grazing. There is no cultivation in the area. The study area has low to medium agricultural sensitivity and is **not deemed feasible for further assessment during the EIA Phase**. The proposed project offers some positive impact on agriculture by way of improved financial security for farming operations, as well as wider, societal benefits. The development of the proposed project at the preferred site is more favourable than the agricultural land-use alternative.

- **Type of Activity Alternative:**

- This relates to the generation of electricity from a renewable energy source, and in this particular case, from solar resources. The **generation of electricity from a renewable energy source was the only activity considered** by the Applicant, and thus considered in this Scoping and EIA Process. **No other activity types were considered or deemed appropriate** based on the expertise of the Applicant.

- **Renewable Energy Alternatives:**

- Given the above, the development of Solar PV is the preferred and only renewable energy technology to be developed on site because the site has a **very good solar resource availability** (i.e. GHI of 2 000 to 2 200 kWh/m² in terms of the long-term yearly total) and the **local conditions are favourable**.
- In addition, **Hydro Power and Biomass Energy** are deemed **unsuitable**.
- The study area does have wind resources (i.e. 301 – 500 W/m²), however other sites might have better wind resources. In addition, based on the findings of the Avifauna Specialist Assessment, the presence of certain bird species would make wind energy development and associated impacts **more difficult to manage and there would be limited space available based on the Very High and High sensitivities**.

- **Preferred Site and Development Footprint within the site:**
 - The preferred site for all the proposed Kudu Solar Facilities comprises the following farm portions which cover a combined footprint of 8 150 ha, which serves as the study area for this Scoping and EIA Process. This is the approved site as per the accepted Final Scoping Report:
 - Remaining Extent of the Farm Bas Berg No. 88
 - Remaining Extent of Portion 3 of the Farm Bas Berg No. 88
 - Portion 4 (Portion of Portion 3) of the Farm Bas Berg No. 88
 - Remaining Extent of Portion 2 (Middel Plaats) (a Portion of Portion 1) of the Farm Grasspan No. 40
 - Remaining Extent of the Farm Annex Wolve Kuil No. 41
 - Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41
 - Portion 2 of the Farm Wolve Kuil No. 43
 - Remaining Extent of the Farm Wolve Kuilen No. 42
 - This led to the identification of the Original Scoping Buildable Areas within the preferred site. Furthermore, a screening and site verification exercise of the study area was undertaken by the specialist team during the Scoping Phase. The findings of the Scoping Level Specialist Assessments were used to determine the Revised Scoping Buildable Areas. The Revised Scoping Buildable Areas avoided the no-go sensitivities identified by the specialists.
 - The buildable areas and preferred project layout have been confirmed during this EIA Phase. A layout plan has been included in the Chapter 2 of this EIA Report.
 - The location of the preferred development footprint and buildable area for Kudu Solar Facility 1 is on the following properties: Remaining Extent of the Farm Bas Berg No. 88; and Remaining Extent of Portion 3 of the Farm Bas Berg No. 88.
- **Technology Alternatives**
 - Only the PV solar panel type has been considered in this Scoping and EIA Process, along with various mounting options that will be considered in the design.
 - The following types of BESS technologies have been assessed in the EIA Phase and the preferred alternative has been selected, as detailed in Chapter 20 of this EIA Report:
 - Lithium-ion BESS; and
 - RFB.

5.3 Summary of Legislative Requirements for the Assessment of Alternatives

As noted in Chapter 1 of this EIA Report, the 2014 NEMA EIA Regulations (as amended) have certain requirements in terms of the selection of the **proposed preferred activity, site and location of the development footprint within the site**. Table 5.5 below indicates the requirements of the 2014 NEMA EIA Regulations (as amended) in terms of alternatives, and a corresponding response from the EAP showing how the requirements have been addressed in this report.

Table 5.5: Requirements for the consideration of Alternatives based on the 2014 NEMA EIA Regulations (as amended).

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
1	Appendix 3 – 3 – 1 – h – (i)	<p>3. (1) 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:</p> <p>(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:</p> <p>(i) details of all the development footprint alternatives considered;</p>	Refer to Sections 5.1, 5.2, and 5.3 (i.e. this section) of this chapter which provides a description of the process that led to the identification of the preferred alternatives and which alternatives were taken further into the EIA Phase for assessment.
2	Appendix 3 – 3 – 1 – h – (ii)	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Refer to Chapter 4 of this EIA Report and Appendix F and H, which details the process followed in terms of Public Participation and includes the supporting documentation.
3	Appendix 3 – 3 – 1 – h – (iii)	(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;	Refer to Appendix F.5 of this EIA Report for the Issues and Responses Trail, which includes the issues raised by Interested and Affected Parties (I&APs) during the 30-day comment period on the Background Information Document. Furthermore, Appendix F.11 of this EIA Report includes a record of all comments received during the 30-day comment period on the Draft Scoping Report, as well as adequate responses. Comments raised during the 30-day review of the EIA Report have been captured and responded to in a Comments and Responses Trail in Appendix H.7 of the Final EIA Report. In addition, the specialist studies are included in Chapters 6 to 17 of this EIA Report, which also discusses the issues and comments raised during the Scoping Phase (and EIA Phase, as relevant).
4	Appendix 3 – 3 – 1 – h – (iv)	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	<p>Refer to Chapter 3 and Chapters 6 to 17 of this EIA Report for a description of the environmental sensitivities associated with the development footprint and study area.</p> <p>Section 5.1.4 of this chapter also provides information on environmental attributes that</p>

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
			were considered in the selection of the preferred site for the proposed project.
5	Appendix 3 – 3 – 1 – h – (v)	(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;	<p>In terms of the no-go alternative, this is not considered as the preferred alternative, as discussed in Section 5.1.1 of this chapter. The impacts and risks of both adopting and not adopting the no-go alternative have been discussed in this section. Furthermore, this has been unpacked by the relevant specialists in this EIA Phase.</p> <p>Feedback on the impacts and risks that informed the identification of the preferred activity (i.e. generation of energy from solar resources) is provided in Section 5.1.3 and Section 5.1.4 above. Such feedback relating to the preferred site and location of the development footprint within the site is captured in Chapters 6 to 17 of this EIA Report, which includes the specialist assessment of impacts and risks of the proposed project, and it includes a description and assessment of the nature, significance, consequence, extent, duration and probability of the identified impacts for the preferred alternatives, as well as an assessment of the reversibility and irreplaceability of the potential identified impacts, as well as the degree to which the identified impacts can be avoided, managed or mitigated (as relevant).</p> <p>Furthermore, two technologies for the BESS have been assessed in terms of impacts and risks in this EIA Phase. The preferred alternative has been selected, as described in Chapter 20 of this EIA Report.</p>
6	Appendix 3 – 3 – 1 – h – (vi)	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Refer to Chapter 4 of this EIA Report, as well as the Specialist Assessments for the impact assessment methodology that was used in the assessment of impacts.
7	Appendix 3 – 3 – 1 – h – (vii)	(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	Feedback on the impacts and risks that informed the identification of the preferred activity (i.e. generation of energy from solar resources) is provided in Section 5.1.3 and

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
		geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5.1.4 above. Such feedback relating to the preferred site is captured in Chapters 6 to 17 of this EIA Report. These chapters include an assessment of impacts and risks of the proposed project at the preferred site.
8	Appendix 3 – 3 – 1 – h – (viii)	(viii) the possible mitigation measures that could be applied and level of residual risk;	
10	Appendix 3 – 3 – 1 – h – (ix)	(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Where no further alternatives were considered, a motivation has been provided in this chapter, within the relevant sections.
11	Appendix 3 – 3 – 1 – h – (x)	(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.	Refer to Section 5.2 of this chapter for a concluding statement.



CHAPTER 6: Agriculture Compliance Statement

Johann Lanz

Soil Scientist (Pr.Sci.Nat.)
Reg. no. 400268/12

Cell: 082 927 9018
e-mail: johann@johannlanz.co.za

1A Wolfe Street
Wynberg
7800
Cape Town
South Africa

**SITE SENSITIVITY VERIFICATION
AND
AGRICULTURAL COMPLIANCE STATEMENT
FOR
PROPOSED DEVELOPMENT OF A SOLAR PHOTOVOLTAIC (PV) FACILITY
(KUDU SOLAR FACILITY 1) AND ASSOCIATED INFRASTRUCTURE
NEAR DE AAR, IN THE NORTHERN CAPE**

Report by
Johann Lanz

Version 1: 19 May 2023

Version 2: July 2023

TABLE OF CONTENTS

1.	INTRODUCTION	6
2.	PROJECT DESCRIPTION	7
2.1	Study Area Definition	7
3.	TERMS OF REFERENCE	8
4.	METHODOLOGY OF STUDY	9
4.1	Methodology for assessing the agro-ecosystem	9
5.	ASSUMPTIONS, UNCERTAINTIES OR GAPS IN KNOWLEDGE OR DATA	10
6.	APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS	10
7.	SITE SENSITIVITY VERIFICATION	11
8.	BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM	13
9.	ASSESSMENT OF AGRICULTURAL IMPACT	14
9.1	What constitutes an agricultural impact?	14
9.2	The significance of agricultural impact and the factors that determine it	14
9.3	Impact identification and discussion	15
9.3.1	Comments and response - interested and affected parties	16
9.4	Cumulative impacts	19
9.5	Impacts of the no-go alternative	23
9.6	Comparative assessment of alternatives	23
9.7	Micro-siting to minimize fragmentation and disturbance of agricultural activities	23
9.8	Confirmation of linear activity impact	24
9.9	Impact footprint	24
9.10	The 10% rule	25
9.11	Impact assessment and statement	26
10.	ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS	28
11.	CONCLUSIONS	35
12.	REFERENCES	36
	APPENDIX 1: SPECIALIST CURRICULUM VITAE	37
	APPENDIX 2: DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH	38
	APPENDIX 3: SACNASP REGISTRATION CERTIFICATE	40
	APPENDIX 4: PROJECTS INCLUDED IN CUMULATIVE IMPACT ASSESSMENT	41

TABLES

Table 1:	Compliance of the Kudu solar facilities with the allowable development limits.	25
Table 2:	Management plan for the planning and design phase.....	29
Table 3:	Management plan for the construction phase.....	30
Table 4:	Management plan for the operational phase	32
Table 5:	Management plan for the decommissioning phase	33

FIGURES

Figure 1:	Locality map of the proposed solar facility north-east of the town of De Aar.	6
Figure 2:	The proposed agricultural footprint of the development (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high).	13
Figure 3:	Projects considered in cumulative impact assessment.	21

EXECUTIVE SUMMARY

The purpose of the agricultural component in Environmental Authorisation 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.

An agricultural impact is a temporary or permanent change to the future production potential of land. Whether a development should receive agricultural approval or not should be evaluated by asking the question: Does the extent of the loss of future agricultural production potential that will result from this development, justify keeping the land solely for agricultural production and therefore not approving the development?

South Africa needs agricultural production for food security. It also urgently needs renewable energy development. In order to achieve its renewable energy generation goals, agriculturally zoned land will inevitably need to be used for renewable energy generation.

The conclusion of this assessment is that the proposed development offers a valuable opportunity for renewable energy development with very little loss of future agricultural production potential.

This is substantiated by the following points:

- The proposed development will occupy land that is of very limited land capability, which is totally insufficient for crop production. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.
- The amount of agricultural land used by the development is well 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 lower agricultural production potential.
- The proposed development offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
- The proposed development poses a low risk in terms of causing soil degradation because degradation can be prevented by standard, best practice mitigation actions.
- The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.

- In addition, the proposed development will contribute to the country's need for energy generation, particularly renewable energy that has much lower environmental and agricultural impact than existing, coal powered energy generation.
- All renewable energy development in South Africa will contribute 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.

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

1. INTRODUCTION

Environmental authorisation is being sought for the proposed development of 12 solar photovoltaic (PV) facilities (Kudu Solar Facilities 1 to 12) and associated infrastructure, near De Aar, in the Northern Cape (see location in Figure 1). In terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA), an application for environmental authorisation requires an agricultural assessment. In this case, based on the verified sensitivity of the site, the level of agricultural assessment required is an Agricultural Compliance Statement. Separate reports have been compiled for each facility. This report covers the Kudu Solar Facility 1 and associated infrastructure.



Figure 1: Locality map of the proposed solar facility north-east of the town of De Aar.

Johann Lanz was appointed as an independent agricultural specialist to conduct the agricultural assessment. The objective and focus of an agricultural assessment are to assess whether or not the

proposed development will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether or not it should be approved.

The purpose of including an agricultural component in Environmental Authorisation 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 aim of the agricultural protocol of NEMA is primarily to preserve the agricultural production potential of scarce arable land by ensuring that development does not exclude agricultural production from such land or impact it to the extent that the crop production potential is reduced.

However, all land that is excluded from potential future agricultural use by this development is not suitable for crop production and therefore does not have high priority for being conserved as agricultural production land.

2. PROJECT DESCRIPTION

The proposed Kudu Solar PV cluster will entail the development of up to 12 Solar PV Facilities. Each proposed facility will consist of the standard infrastructure of a PV facility including PV array; inverters; battery storage; auxiliary buildings; access and internal roads; fencing and an on-site substation complex (including a switching station and collector station) and grid connection (which is subject to a separate assessment and EA). Each facility will have a total generating capacity ranging from 50 MWac to 350 MWac.

The exact nature and layout of the different infrastructure within a solar energy facility has absolutely no bearing on the significance of agricultural impacts. It is therefore not necessary to detail the design and layout of the facility any further in this assessment. All that is of relevance is simply the total footprint of the facility that excludes agricultural land use or impacts agricultural land, referred to as the agricultural footprint. Whether that footprint comprises a solar array, a road or a substation is irrelevant to agricultural impact.

2.1 Study Area Definition

The study area for all the proposed Kudu Solar Facilities is the full extent of the eight affected farm properties on which the proposed PV Facilities will be constructed. The full extent of these properties has been assessed in this study in order to identify environmental sensitivities and no-go areas. The total study area for all the Kudu Solar Facilities is approximately 8 150 hectares (ha).

As part of the Scoping Phase, the full study area and the Original Scoping Buildable Areas (which fall within the entire study area) were assessed and considered in the Agricultural Compliance Statement (at Scoping).

Following the identification of sensitivities during the Scoping Phase, discussions with landowners and other considerations such as the capacities of the Bidding Window 6, the proposed projects were re-clustered and a total of up to 12 Solar PV Facilities were being proposed. The Project Developer considered such sensitivities and formulated the Revised Scoping Buildable Areas.

The revised Scoping Buildable Area for all 12 of the Kudu Solar Facilities is considered suitable from an agricultural perspective, as the sensitivities identified have been taken into consideration.

The Revised Scoping Buildable Areas have been used to inform the design of the layout and development footprints, which is now being assessed in the EIA Phase.

3. TERMS OF REFERENCE

The terms of reference for this study is to fulfill the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources*, gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

The level of agricultural assessment required in terms of the agricultural protocol for sites of less than high sensitivity, as this site was verified to be, is an Agricultural Compliance Statement. The protocol also requires that a Site Sensitivity Verification be done.

The terms of reference for such an assessment, as stipulated in the protocol, are listed below, and the section number of this report which fulfils each stipulation is given after it in brackets.

1. The Agricultural Compliance Statement must be prepared by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professions (SACNASP) (**Appendix 3**).
2. The compliance statement must:
 1. be applicable to the preferred site and proposed development footprint;
 2. confirm that the site is of “low” or “medium” sensitivity for agriculture (**Section 7**); and
 3. indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site (**Section 9.11**).

3. The Agricultural Compliance Statement must contain, as a minimum, the following information:
 1. details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the statement including a curriculum vitae **(Appendix 1)**;
 2. a signed statement of independence by the specialist **(Appendix 2)**;
 3. a map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool **(Figure 2)**;
 4. calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development including supporting infrastructure **(Section 9.9)**;
 5. confirmation that the development footprint is in line with the allowable development limits contained in Table 1 of the protocol **(Section 9.9)**;
 6. confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimize fragmentation and disturbance of agricultural activities **(Section 9.7)**;
 7. a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not, of the proposed development and a recommendation on the approval, or not of the proposed development **(Section 9.11)**;
 8. any conditions to which this statement is subjected **(Section 11)**;
 9. in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase **(Section 9.8)**;
 10. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr) **(Section 10)**; and
 11. a description of the assumptions made and any uncertainties or gaps in knowledge or data **(Section 5)**.

4. METHODOLOGY OF STUDY

4.1 Methodology for assessing the agro-ecosystem

As per the protocol requirement, the assessment was based on a desktop analysis of existing soil and agricultural potential data for the site. The following sources of information were used:

- Soil data was sourced from the land type data set, of the Department of Agriculture, Forestry and Fisheries (DAFF) [currently operating as the Department of Agriculture, Land Reform and Rural Development (DALRRD)]. This data set originates from the land type survey that was conducted from the 1970's until 2002. It is the most reliable and comprehensive national database of soil information in South Africa and although the data was collected some time ago, it is still entirely relevant as the soil characteristics included in the land type data do not change within time scales of hundreds of years.
- Land capability data was sourced from the 2017 National land capability evaluation raster data layer produced by the DAFF, Pretoria.
- Field crop boundaries were sourced from Crop Estimates Consortium, 2019. *Field Crop Boundary data layer, 2019*. Pretoria. Department of Agriculture, Forestry and Fisheries.
- Rainfall and evaporation data was sourced from the SA Atlas of Climatology and Agrohydrology (2009, R.E. Schulze) available on Cape Farm Mapper.
- Grazing capacity data was sourced from the 2018 DAFF long-term grazing capacity map for South Africa, available on Cape Farm Mapper.
- Satellite imagery of the site and surrounds was sourced from Google Earth.

These sources of information are considered entirely adequate and comprehensive for the purposes of this assessment.

5. ASSUMPTIONS, UNCERTAINTIES OR GAPS IN KNOWLEDGE OR DATA

There are no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

6. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

A renewable energy facility requires approval from the National Department of Agriculture, Land Reform and Rural Development (DALRRD) if the facility is on agriculturally zoned land. There are two approvals that apply. The first is a No Objection Letter for the change in land use issued by the Deputy Director General (Agricultural Production, Health and Food Safety, Natural Resources and Disaster Management). This letter is one of the requirements for receiving municipal rezoning. It is advisable to apply for this as early in the renewable development process as possible because not receiving this DALRRD approval is a fatal flaw for a project. Note that a positive EA does not assure DALRRD's approval of this. This application requires a motivation backed by good evidence that the development will not significantly compromise the future agricultural production potential of the

development site. This Agricultural Compliance Statement will suffice for that purpose.

The second required approval is a consent for long-term lease in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). If DALRRD approval for the development has already been obtained in the form of the No Objection letter, then SALA approval should be easy and not present any difficulties. Note that SALA approval is not required if the lease is over the entire farm portion. SALA approval (if required) can only be applied for once the Municipal Rezoning Certificate and EA is in hand.

Rehabilitation after disturbance to agricultural land is managed by the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA). A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as “any act by means of which the topsoil is disturbed mechanically”. The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of a renewable energy facility and its associated infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by Anneliza Collett (Acting Scientific Manager: Natural Resources Inventories and Assessments in the Directorate: Land and Soil Management of the DALRRD). The construction and operation of the facility will therefore not require consent from the DALRRD in terms of this provision of CARA.

7. SITE SENSITIVITY VERIFICATION

In terms of the gazetted agricultural protocol, a site sensitivity verification must be submitted that:

1. confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.;
2. contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

A site investigation was not considered necessary for this assessment, including for the site sensitivity verification. This is because the land capability limitation is predominantly a function of climate, which cannot be informed by a site assessment.

Agricultural sensitivity, as used in the national web-based environmental screening tool, is a direct function of the capability of the land for agricultural production. The general assessment of agricultural sensitivity that is employed in the national web-based environmental screening tool, identifies all arable land that can support viable crop production, 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 2. Because none of the land is classified as cropland, agricultural sensitivity is purely a function of land capability. The land capability of the site on the screening tool is predominantly 5 and 6, but varies from 3 to 7. 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 3 to 5 translate to a low agricultural sensitivity and values of 6 to 7 translate to a medium agricultural sensitivity, although there is little real difference between low and medium agricultural sensitivity on the ground.

The agricultural sensitivity, as identified by the screening tool, is confirmed by this assessment. The motivation for confirming the sensitivity is predominantly that the climate data (low rainfall of approximately 280 to 305 mm per annum and high evaporation of approximately 1,470 to 1,540 mm per annum) proves the area to be arid, and therefore of limited land capability.

This site sensitivity verification verifies the entire site as being of less than high agricultural sensitivity with a land capability value of 5 to 6. The land capability value is in keeping with the climate limitations that make the site totally unsuitable for dryland crop production. The required level of agricultural assessment is therefore confirmed as an Agricultural Compliance Statement.

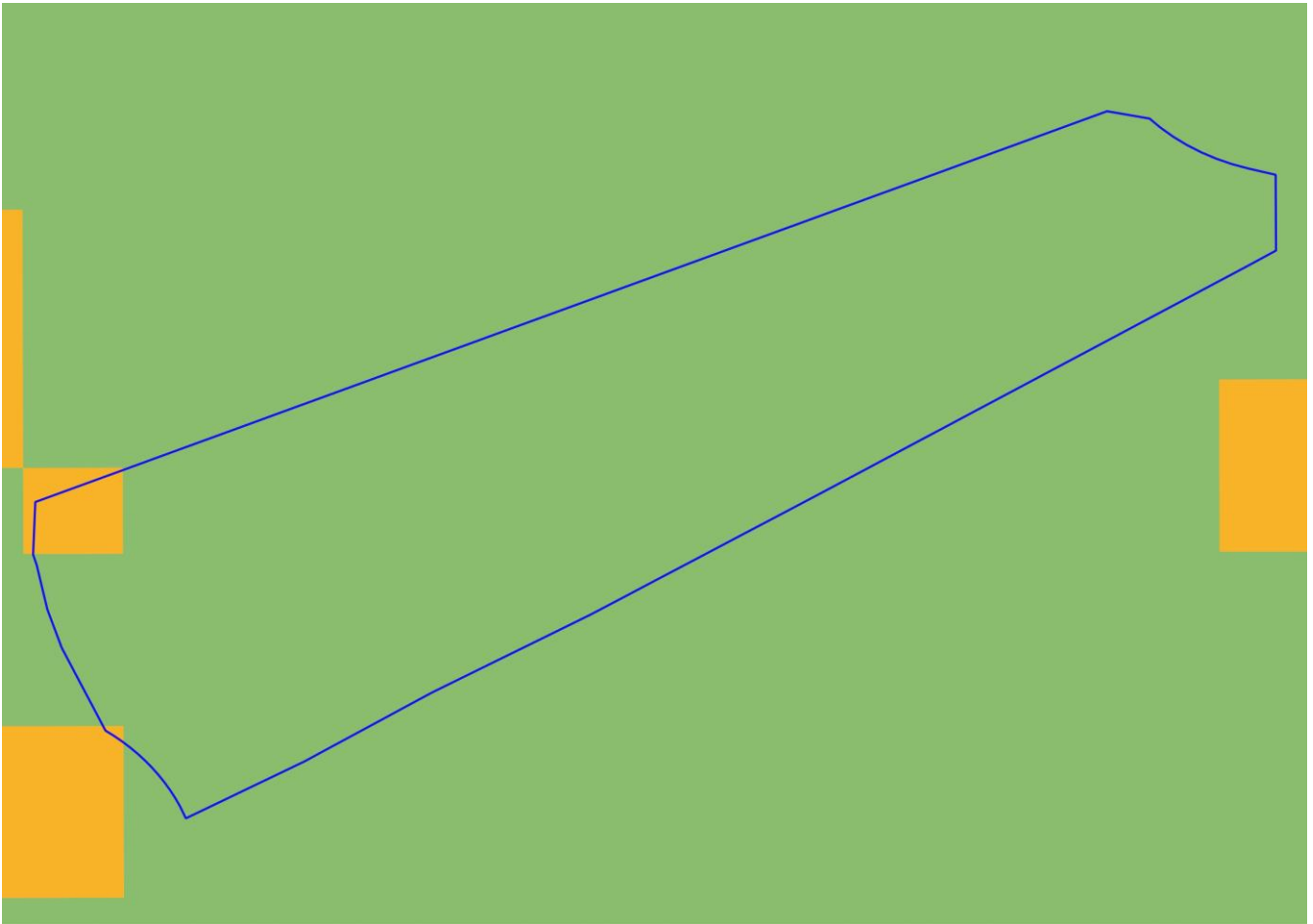


Figure 2: The proposed agricultural footprint of the development (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high).

8. BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The arid climate (low rainfall of approximately 280 to 305 mm per annum and high evaporation of approximately 1,470 to 1,540 mm per annum) is the limiting factor for land capability, regardless of the soil capability and terrain. Moisture availability is insufficient for crop production without irrigation and the potential agricultural land use of the site is therefore limited to grazing. The land is used for the grazing of sheep and game. The land has a fairly low long term grazing capacity of 20 hectares per large stock unit. Because climate is the limiting factor that controls production

potential, it is the only aspect of the agro-ecosystem description that is required for assessing the agricultural impact of this development.

9. ASSESSMENT OF AGRICULTURAL IMPACT

9.1 What constitutes an agricultural impact?

An agricultural impact is a temporary or permanent change to the future production potential of land. If a development will not change the future production potential of the land, then there is no agricultural impact. A decrease in future production potential is a negative impact and an increase is a positive impact. The significance of the agricultural impact is directly proportional to the extent of the change in production potential.

9.2 The significance of agricultural impact and the factors that determine it

As noted above, the purpose of the agricultural component in Environmental Authorisation 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. Impacts such as erosion that degrade the agricultural resource base, pose a threat to production potential and therefore are within the scope of an agricultural impact assessment.

When the agricultural impact of a development involves the permanent or long term non-agricultural use of potential agricultural land, as it does in this case, the focus and defining question of the agricultural impact assessment is to determine the importance, from an agricultural production point of view, of that land not being utilised for the development and kept solely for agriculture.

In other words, the significance of an agricultural impact should be evaluated by asking the question: Does the extent of the loss of future agricultural production potential that will result from this development, justify keeping the land solely for agricultural production and therefore not approving the development? If the loss is small, then it is unlikely to justify non approval. If the loss is big, then it is likely to justify it.

The extent of the loss is a direct function of two things, firstly the amount of land that will be lost and secondly, the production potential of the land that will be lost. The land's production potential must be evaluated on a scale of land capability (which equates to production potential) that is

applicable across the country, because the need is to conserve the higher potential land in the country, not the lower potential land. If the land capability is below a certain threshold then its loss as agricultural production land may be justified, depending on the importance and value of the proposed non-agricultural land use that will replace it. That threshold is determined by the scarcity of arable crop production land in South Africa and the relative abundance of land that is only good enough to be used for grazing. If land is of sufficient land capability to support viable and sustainable crop production then it is considered to be above the threshold for being conserved as agricultural production land. If land is not of sufficient land capability to support viable and sustainable crop production, then it is considered to be below the threshold and its loss as agricultural production land may be justified. When the replacing land use is something that has high national importance and benefit, such as renewable energy development, the use of agricultural land that is below the threshold is considered to be justified.

It is also important to note that renewable energy facilities have both positive and negative effects on the production potential of land (see Section 9.3) and so it is the net sum of these positive and negative effects that determines the extent of the change in future production potential.

Another aspect to consider is the scale at which the significance of the agricultural impact is assessed. The change in production potential of a farm or significant part of a farm is likely to be highly significant at the scale of that farm, but may be much less so at smaller scales. This assessment considers a regional and national scale to be the most appropriate one for assessing the significance of the loss of agricultural production potential because, as has been discussed above, the purpose is to ensure the conservation of agricultural land required for national food security.

It should be noted that, in assessing agricultural impact, the exact nature and layout of the different infrastructure within a solar energy facility has absolutely no bearing on the significance of agricultural impacts. All that is of relevance is simply the total footprint of the facility that excludes agricultural land use or impacts agricultural land, referred to as the agricultural footprint.

9.3 Impact identification and discussion

Three potential negative agricultural impacts have been identified, that are direct impacts:

1. **Loss of agricultural potential by occupation of land** - Agricultural land directly occupied by the development infrastructure will become unavailable for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project

lifetime. This impact is relevant only in the construction phase. No further loss of agricultural land use occurs in subsequent phases.

2. **Loss of agricultural potential by soil degradation** – This impact only occurs during the construction and decommissioning phases, but only becomes relevant once the land is returned to agricultural land use after decommissioning. Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. Although the site is susceptible to soil erosion, it can be fairly easily and effectively prevented by standard best practice soil degradation control measures, as recommended and included in the EMPr.
3. **Loss of agricultural potential by dust generation** – The disturbance of the soil surface, particularly during construction, will generate dust that can negatively impact surrounding veld and farm animals.

Two positive agricultural impacts have been identified, that are indirect impacts and lead to enhanced agricultural potential through:

1. **increased financial security for farming operations** - Reliable income will be generated by the farming enterprises through the lease of the land to the energy facility. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.
2. **improved security against stock theft and other crime** due to the presence of security infrastructure and security personnel at the energy facility.

The extent to which any of these impacts is likely to actually affect levels of agricultural production is small and the significance of agricultural impacts is therefore low.

9.3.1 Comments and response - interested and affected parties

Comments related to agricultural impacts associated with the proposed project were raised by Interested and Affected Parties during the review period of the Draft Scoping Report. These comments were considered during the Scoping Phase and addressed accordingly. These comments are summarised below with corresponding responses from the specialist.

ENVIRONMENTAL IMPACT ASSESSMENT REPORT: Scoping and Environmental Impact Assessment (EIA)
Process for the Proposed Development of a Solar Photovoltaic (PV) Facility (Kudu Solar Facility 1) and associated
infrastructure, near De Aar, Northern Cape Province

KEY ISSUE	RESPONSE
Concerns were raised about the use of large areas of agricultural land and its impact on farming (<u>Coverage of the Affected Farm Properties</u>).	<p>During the construction phase, one of the main activities will include removal of vegetation for the proposed infrastructure, where necessary, within the approved development footprint to facilitate the construction and/or establishment of infrastructure. Note that vegetation is planned to be trimmed within the PV array area (and not removed completely). Therefore, even though it appears that the majority of certain farms will be covered by Solar PV panels, not all the vegetation will be removed completely.</p> <p>In addition, with regards to the concern about the use of large areas of agricultural land and its impact on farming, 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 in a region such as the one being assessed, which has no crop production potential, and low grazing capacity, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country.</p>
Queries on the understanding of the subdivision of agricultural land act (Act 70 of 1970) in relation to the proposed developments.	An Agricultural Compliance Statement (i.e. this report) has been undertaken as part of this EIA Process, in compliance with the requirements of the Assessment Protocols published in GN 320. The Agricultural Compliance Statement provides feedback on the relevant legislation and permits required for the proposed project (See Section 6 of this report). A renewable energy facility requires approval from the National Department of Agriculture, Land Reform and Rural Development (DALRRD) if the facility is on agriculturally zoned land. There are two approvals that apply. The first is a No Objection Letter for the change in land use issued by the Deputy Director General (Agricultural Production, Health and Food Safety, Natural Resources and Disaster Management). The second required approval is a consent for long-term lease in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). If DALRRD approval for the development has already been obtained in the form of the No Objection letter, then SALA approval should not present any difficulties. Note that SALA approval is not required if the lease is over the entire farm portion. SALA approval (if required) can only be applied for once the Municipal Rezoning Certificate and EA is in hand. The Applicant has taken cognisance of this and will apply for the relevant approval in terms of SALA once the necessary pre-requisite permits are obtained.
Queries on the potential benefits that the proposed Kudu Solar Facilities will have on the farming community of Philipstown district (<u>Benefits to the Farming Community</u>).	<p>It is acknowledged that the proposed projects (at its closest point) are located about 20 km from Phillipstown. As noted in this Agricultural Compliance Statement, one of the positive impacts of the proposed projects is the improved security against stock theft and other crime due to the presence of security infrastructure and security personnel at the proposed Solar PV Facilities. It is believed that this positive impact will extend to the surround farms also. Furthermore, a Socio-Economic Assessment was also undertaken as part of this EIA, which is included in Chapter 13 of this EIA Report, which identified various positive socio-economic impacts as a result of the proposed projects.</p> <p>The construction phase will create various employment opportunities. Based on</p>

KEY ISSUE	RESPONSE
	<p>the Socio-Economic Assessment, the majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. In addition, the sector of the local economy that is most likely to benefit from the proposed development is the local service industry, linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site. Operational phase benefits are also discussed in the Socio-Economic Assessment. Therefore, potential benefits of the proposed projects to the surrounding communities have been identified.</p>
<p>Concerns were raised regarding the agricultural sustainability of the proposed development.</p>	<p>This Agricultural Compliance Statement has confirmed that the proposed projects are acceptable from an agricultural perspective, and that the agricultural sensitivity of the site is less than high (mainly low and medium). The Compliance Statement also discusses the allowable development limits for renewable energy developments of more than 20 MW, as per the Agriculture Assessment Protocol of GN320, which essentially refers to the area of a particular agricultural sensitivity category that can be directly impacted (i.e. taken up by the physical footprint) by a renewable energy development. The allowable development limit for non-cropland with a land capability value of less than 8, as this site has been confirmed to be, is 2.5 ha per MW. The proposed facilities are within this limit, as described in Section 9.9 of this report.</p> <p>The above being said, as noted in this Agriculture Compliance Statement, the proposed development will provide reliable and predictable income to the owners of the land on which the proposed project will be constructed and operated on. This income is likely to increase their financial security and could improve farming operations and productivity through increased investment into farming - therefore improved agricultural sustainability. For neighbouring landowners, the proposed project will potentially create various impacts, such as visual impacts. However, the proposed project will have no impact on the agricultural production potential of adjacent farms, and therefore, no impact on agricultural sustainability.</p> <p>South Africa needs agricultural production for food security. It also urgently needs renewable energy development. In order to achieve its renewable energy generation requirements, agriculturally zoned land will inevitably need to be used for renewable energy generation. In order to ensure the sustainability of agricultural production and food security in the country, it is important that renewable energy be located in agricultural areas that have low agricultural production potential, such as the assessed site, and that scarce arable land in productive areas is not sacrificed to renewable energy. Rather than endangering agricultural sustainability, the location of this project is optimal for protecting agricultural sustainability.</p> <p>Furthermore, it is also important to reiterate that the Agriculture Compliance Statement has been undertaken in compliance with the Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Agricultural Resources by Onshore Wind and/or Solar Energy</p>

KEY ISSUE	RESPONSE
	Generation Facilities where the Electricity Output is 20 MW or more, as published in March 2020 (GN 320). The Protocols were gazetted by the National DFFE to ensure that the correct information and methodologies are adopted by specialists undertaking assessments as part of the EIA Process. Complying with the protocols therefore shows that relevant legislation has been adhered to in this regard.
Queries on the socio-economic benefits of the development for farmers and their employees in the greater region, as well as the fairness and equitability of involving only two landowners in the proposed developments.	Various factors were considered by the Project Developer in selecting the preferred site / study area. These factors include land availability, environmental sensitivities, irradiation levels, distance to the national grid, site accessibility, topography, current land use and landowner willingness. The Project Developer also considered adjacent farm portions and approached the landowners; however, this exercise was unsuccessful as the land had already been secured by other developers. Note that whilst income generation for the affected landowners is listed as a positive impact in the Agriculture Compliance Statement and Socio-Economic Assessment, other wider community benefits have also been identified, as noted above in the response to the comment raised regarding "Benefits to the Farming Community".

Comments related to agricultural impacts associated with the proposed project were raised by Interested and Affected Parties during the review period of the Draft EIA Report. These comments are similar to those submitted and considered during the Scoping Phase, and therefore similar responses apply. Concerns were raised about the use of large areas of agricultural land and its impact on farming (Coverage of the Affected Farm Properties); queries on the understanding of the Subdivision Of Agricultural Land Act (Act 70 of 1970) in relation to the proposed developments, and implications thereof; potential benefits that the proposed Kudu Solar Facilities will have on the farming community in the surrounding region (Benefits to the Farming Community); agricultural sustainability of the proposed development; queries on the socio-economic benefits of the development for farmers and their employees in the greater region, as well as the equitability of involving only two landowners in the proposed developments; and not distributing the benefits compared to other proposed projects; queries on the 10% rule; and notes regarding agricultural dependency. Responses have been provided in Appendix H.7 of the Final EIA Report.

9.4 Cumulative impacts

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

the context of the overall impact. But it is not simply the overall impact itself.

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

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

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

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

Proposed Kudu Solar PV facility (1 - 12)
near De Aar, Northern Cape Province
South Africa

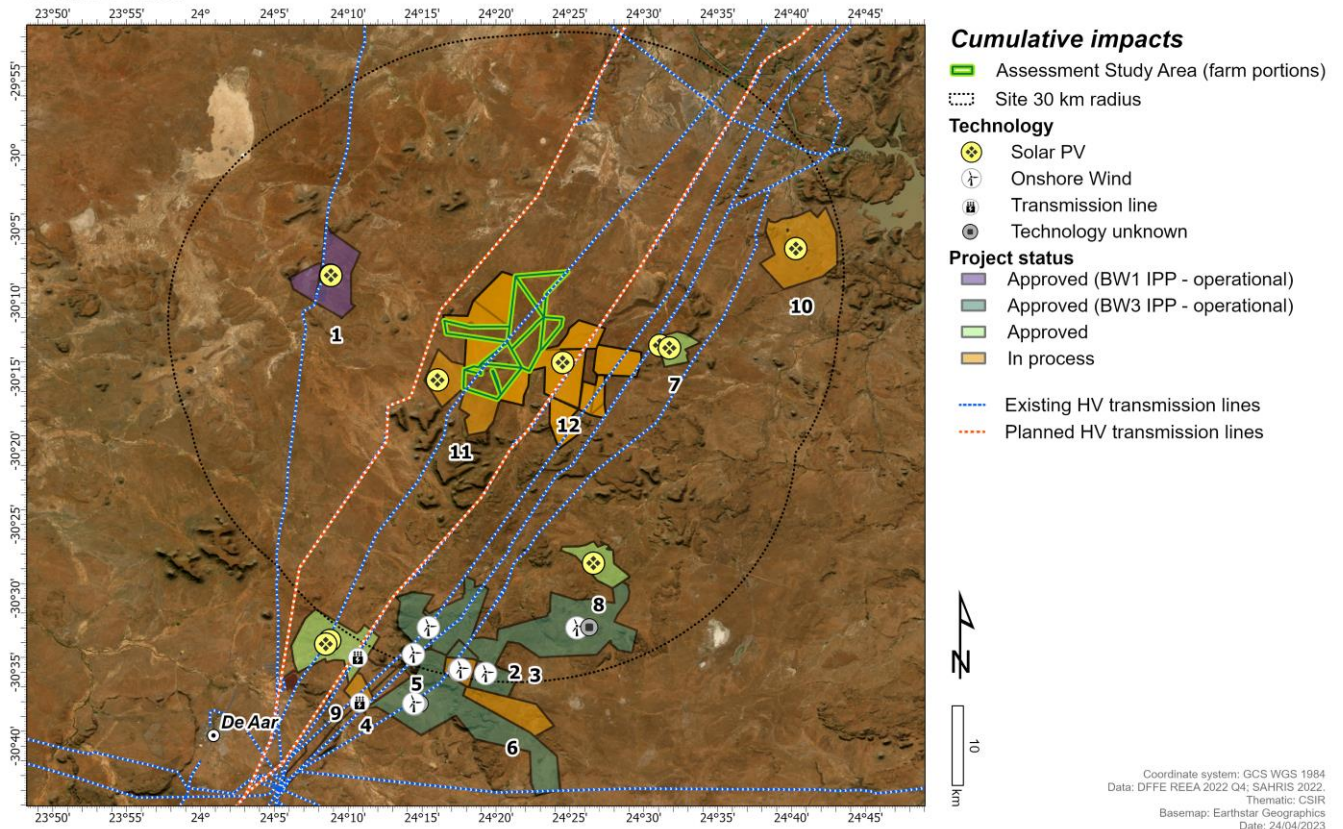


Figure 3: Projects considered in cumulative impact assessment.

This cumulative impact assessment has considered all renewable energy projects within a 30 km radius. These are listed in Appendix 4 of this report and shown in Figure 3. In quantifying the cumulative impact, the area of land taken out of agricultural use as a result of all the projects listed in Appendix 4 (total generation capacity of 6938 MW) will amount to a total of approximately 16,557 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 5.86% of the surface area. This is within an acceptable limit in terms of loss of low potential agricultural land which is only suitable for grazing, and of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has no crop production potential, and low grazing capacity, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential.

Note that power lines do not contribute to loss of agricultural land and are therefore not included in the calculation of affected area. The cumulative impact of grid infrastructure in the area can confidently be assessed as negligible.

All of the projects contributing to cumulative impact for this assessment have the same agricultural impacts in an almost identical agricultural environment, and therefore the same mitigation measures apply to all.

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 creates cumulative impact in such places. However, this is acceptable because it also 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.

Furthermore, it should be noted that there are few land uses, other than renewable energy, that are competing for agricultural land use in this area. The cumulative impact from developments, other than renewable energy, is therefore likely to be low.

As discussed above, the loss of agricultural potential by soil degradation can effectively be prevented for renewable energy developments and therefore does not pose a cumulative impact risk.

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.

9.5 Impacts of the no-go alternative

The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There are no agricultural impacts of the no-go alternative.

The development offers an alternative income source to agriculture, but it excludes agriculture from a proportion of the land. Therefore, even though the excluded land has no crop production potential, the negative agricultural impact of the development is more significant than that of the no-go alternative, and so, purely from an agricultural impact perspective, the no-go alternative is the preferred alternative between the development and the no-go. However, the no-go option would prevent the proposed development from contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa.

9.6 Comparative assessment of alternatives

Design and layout alternatives and technology alternatives within the footprint will make absolutely no material difference to the significance of the agricultural impacts, because it is the total footprint size (and its agricultural production potential) that determines the impact significance. Any alternative layout within the footprint is considered acceptable. Furthermore, in this agricultural environment with uniformly low production potential, the location of the solar sites within the properties will also make absolutely no material difference to the significance of the agricultural impacts.

Technology alternatives with respect to the BESS will make absolutely no material difference to the significance of the agricultural impacts. All BESS technology alternatives are acceptable.

Changes to the detailed layouts are deemed acceptable if the changes remain within the approved buildable areas / development footprints and area assessed during the Scoping and EIA Process with no-go sensitive areas avoided.

9.7 Micro-siting to minimize fragmentation and disturbance of agricultural activities

The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. However, as noted above, the exact position of the footprint and all infrastructure within it will not make any material difference to agricultural impacts and disturbance.

9.8 Confirmation of linear activity impact

The protocol provision of a linear impact confirmation only makes sense when the requirement for an Agricultural Compliance Statement is based on the fact that the development is a linear activity. In this case the verified less than high agricultural sensitivity determines that an Agricultural Compliance Statement suffices, anyway, even for non-linear activities.

9.9 Impact footprint

The agricultural protocol stipulates allowable development limits for renewable energy developments of > 20 MW. Allowable development limits refer to the area of a particular agricultural sensitivity category that can be directly impacted (i.e. taken up by the physical footprint) by a renewable energy development. The agricultural footprint is defined in the protocol as the area that is directly occupied by all infrastructure, including roads, hard standing areas, buildings etc., that are associated with the renewable energy facility during its operational phase, and that result in the exclusion of that land from potential cultivation or grazing. It excludes all areas that were already occupied by roads and other infrastructure prior to the establishment of the energy facility but includes the surface area required for expanding existing infrastructure (e.g. widening existing roads). It therefore represents the total land that is actually excluded from agricultural use as a result of the renewable energy facility (the agricultural footprint).

For a solar energy facility, the agricultural footprint is considered to be the total area inside the security fence of the facility. The allowable development limit on land of low or medium agricultural sensitivity with a land capability of < 8, as this site has been verified to be, is 2.5 ha per MW. This would allow a facility of, for example 150 MW, to occupy an agricultural footprint of $150 \times 2.5 = 375$ hectares. For a development of multiple facilities, what matters is that the combined footprint of all the facilities is within the allowable limits. Table 1 demonstrates that not only is the combined footprint of all 12 Kudu facilities well within the allowable development limits contained in the agricultural protocol (total footprint of only 3268 ha within an allowable footprint of 5450 ha), but each of the individual facilities is as well.

Table 1: Compliance of the Kudu solar facilities with the allowable development limits.

Facility	Generation capacity (MW)	Agricultural footprint (ha)	Allowable development limit (ha)
Kudu 1	50	34	125
Kudu 2	50	51	125
Kudu 3	50	70	125
Kudu 4	50	70	125
Kudu 5	350	537	875
Kudu 6	150	265	375
Kudu 7	350	557	875
Kudu 8	350	542	875
Kudu 9	150	285	375
Kudu 10	150	120	375
Kudu 11	330	506	825
Kudu 12	150	231	375
Total	2180	3268	5450

9.10 The 10% rule

The so-called 10% rule that has been used by DALRRD is not considered to be useful or constructive for assessing the agricultural approval of this project. In this agricultural environment, the rule is likely to simply hinder solar energy development without serving any benefit to agriculture. The argument against using the rule is detailed below.

In order to limit the potential threat that solar energy development in rural areas could pose to agricultural production and to the agricultural economy of those rural areas, DALRRD created the so-called 10% rule to inform the decision of whether a solar energy development on agricultural land should be approved or not. This rule states that a solar energy facility may not utilise more than 10% of the surface area of a farm. Its aim was to ensure that each farm unit remained predominantly agricultural rather than certain farms abandoning agricultural production in favour of renewable energy generation.

The rule was established when solar energy development was new and unknown. However, it is now evident that solar energy development is less of a threat to agricultural production and the agricultural economy than it was initially feared that it might be. Solar energy development has demonstrated benefits for agriculture and has potential to be integrated into the rural agricultural economy. It is a source of much needed income into rural areas. The 10% rule is now considered unnecessary and impractical. It is likely to simply hinder solar energy development without serving any benefit to agriculture. It is far more constructive and effective to focus on integrating renewable energy with agricultural production in a way that provides benefits to agriculture and focuses on minimising loss of future agricultural production potential. This can be done by using only the production potential of land as the deciding factor for solar energy approval.

The problem with the 10% rule and only utilising up to 10% of each farm, is that it forces solar facilities to be spread across the landscape in a way that is impractical and financially non-viable and creates a much larger environmental footprint in the landscape. Furthermore it does not actually make any difference to the loss of agricultural production potential or to the impact on the agricultural economy of the area.

It is important to recognise that there is no real need to limit the amount of land occupied by solar energy facilities. Solar energy will never occupy more than a tiny proportion of the land, anyway. The total extent of South Africa's intended solar development for the foreseeable future was calculated to only occupy 0.4% of the surface area of the 8 original renewable energy development zones (REDZs) that were gazetted in February 2018 (GN 114). This was if all the country's solar development was located only in those 8 REDZs, which it is not. An additional 3 REDZs have been proclaimed since then (i.e. in February 2021 in GN 144) and much of the country's solar development is occurring outside the REDZs. This means that for the foreseeable future, solar energy will only ever occupy much less than 0.4% of land in an area. If it will only ever occupy such a small proportion of the land, anyway, it cannot replace agriculture in the rural economy and it serves no purpose to limit solar facilities to 10% of each farm. From an agricultural production and food security point of view there is only a need to preserve scarce arable land for crop production and therefore to limit solar development to land that is of insufficient land capability to support viable crop production.

9.11 Impact assessment and statement

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. It must provide a substantiated

statement on the acceptability, or not, of the proposed development and a recommendation on the approval, or not of the proposed development.

Nevertheless, the agricultural impact of this proposed development is assessed here as being of low significance.

The conclusion of this assessment is that the proposed development offers a valuable opportunity for renewable energy development with very little loss of future agricultural production potential.

This is substantiated by the following points:

- The proposed development will occupy land that is of very limited land capability, which is totally insufficient for crop production. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.
- The amount of agricultural land used by the development is well 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 lower agricultural production potential.
- The proposed development offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
- The proposed development poses a low risk in terms of causing soil degradation because degradation can be adequately and fairly easily managed by standard, best practice mitigation actions.
- The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.
- In addition, the proposed development will contribute to the country's need for energy generation, particularly renewable energy that has much lower environmental and agricultural impact than existing, coal powered energy generation.
- All renewable energy development in South Africa will contribute 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.

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

10. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The environmental management programme inputs for the protection of soil resources for the PV facility are presented in the tables below for each phase of the development.

For the overhead or underground power lines, and for the substations, there are no additional mitigation measures required, over and above what has already been included in the Generic Environmental Management Programmes (EMPr's) for the development and expansion for overhead electricity transmission and distribution infrastructure and of substation infrastructure for the transmission and distribution of electricity as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.

Table 2: Management plan for the planning and design phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. This is included in the stormwater management plan.	Ensure that the stormwater run-off control is included in the engineering design.	Once-off during the design phase.	Holder of the EA

Table 3: Management plan for the construction phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the stormwater run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	Every 2 months during the construction phase	Environmental Control Officer (ECO)
Erosion	That vegetation clearing does not pose a high erosion risk.	Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	Every 4 months during the construction phase	Environmental Control Officer (ECO)
Topsoil loss	That topsoil loss is minimised	If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread	Record GPS positions of all significant occurrences (that is an area of greater than 25 square metres) of below-surface soil disturbance (e.g., excavations). Record the date of topsoil stripping and replacement. Check	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			<i>Methodology</i>	<i>Frequency</i>	<i>Responsibility</i>
		over the entire disturbed surface.	that topsoil covers the entire disturbed area.		

Table 4: Management plan for the operational phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That existence of hard surfaces causes no erosion on or downstream of the site.	Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring.	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the stormwater run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	Bi-annually	Facility Environmental Manager
Erosion	That denuded areas are re-vegetated to stabilise soil against erosion	Facilitate re-vegetation of denuded areas throughout the site	Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	Bi-annually	Facility Environmental Manager

Table 5: Management plan for the decommissioning phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the stormwater run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	Environmental Control Officer (ECO)
Erosion	That vegetation clearing does not pose a high erosion risk.	Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	Every 4 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Topsoil loss	That topsoil loss is minimised	If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	Record GPS positions of all significant occurrences (that is an area of greater than 25 square metres) of below-surface soil disturbance (e.g., excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

11. CONCLUSIONS

The entire site was verified in this assessment as being of less than high sensitivity for impacts on agricultural resources with a land capability value of 5 to 6. The agricultural production potential of the site is completely limited by the aridity of the climate, and it is therefore only suitable as grazing land.

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

The conclusion of this assessment is that the proposed development offers a valuable opportunity for renewable energy development with very little loss of future agricultural production potential.

This is substantiated by the following points:

- The proposed development will occupy land that is of very limited land capability, which is totally insufficient for crop production. There is no scarcity of such agricultural land in South Africa and its conservation for agricultural production is not therefore a priority.
- The amount of agricultural land used by the development is well 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 lower agricultural production potential.
- The proposed development offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
- The proposed development poses a low risk in terms of causing soil degradation because degradation can be adequately and fairly easily managed by standard, best practice mitigation actions.
- The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.
- In addition, the proposed development will contribute to the country's need for energy generation, particularly renewable energy that has much lower environmental and agricultural impact than existing, coal powered energy generation.

- All renewable energy development in South Africa will contribute 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.

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

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

12. REFERENCES

Crop Estimates Consortium, 2019. *Field Crop Boundary data layer, 2019*. Pretoria. Department of Agriculture, Forestry and Fisheries.

Department of Agriculture Forestry and Fisheries, 2018. Long-term grazing capacity map for South Africa developed in line with the provisions of Regulation 10 of the Conservation of Agricultural Resources Act, Act no 43 of 1983 (CARA), available on Cape Farm Mapper. Available at: <https://gis.elsenburg.com/apps/cfm/>

Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data layer, 2017. Pretoria.

Department of Agriculture, Forestry and Fisheries, 2002. National land type inventories data set. Pretoria.

DEA, 2015. Strategic Environmental Assessment for wind and solar photovoltaic development in South Africa. CSIR Report Number CSIR: CSIR/CAS/EMS/ER/2015/001/B. Stellenbosch.

Schulze, R.E. 2009. SA Atlas of Climatology and Agrohydrology, available on Cape Farm Mapper. Available at: <https://gis.elsenburg.com/apps/cfm/>

APPENDIX 1: SPECIALIST CURRICULUM VITAE

Johann Lanz Curriculum Vitae

Education

M.Sc. (Environmental Geochemistry)	University of Cape Town	1996 - 1997
B.Sc. Agriculture (Soil Science, Chemistry)	University of Stellenbosch	1992 - 1995
BA (English, Environmental & Geographical Science)	University of Cape Town	1989 - 1991
Matric Exemption	Wynberg Boy's High School	1983

Professional work experience

I have been registered as a Professional Natural Scientist (Pr.Sci.Nat.) in the field of soil science since 2012 (registration number 400268/12) and am a member of the Soil Science Society of South Africa.

Soil & Agricultural Consulting Self employed 2002 - present

Within the past 5 years of running my soil and agricultural consulting business, I have completed more than 170 agricultural assessments (EIAs, SEAs, EMPRs) in all 9 provinces for renewable energy, mining, electrical grid infrastructure, urban, and agricultural developments. I was the appointed agricultural specialist for the nation-wide SEAs for wind and solar PV developments, electrical grid infrastructure, and gas pipelines. My regular clients include: Zutari; CSIR; SiVEST; SLR; WSP; Arcus; SRK; Environamics; Royal Haskoning DHV; ABO; Enertrag; WKN-Windcurrent; JG Afrika; Mainstream; Redcap; G7; Mulilo; and Tiptrans. Recent agricultural clients for soil resource evaluations and mapping include Cederberg Wines; Western Cape Department of Agriculture; Vogelfontein Citrus; De Grendel Estate; Zewenwacht Wine Estate; and Goedgedacht Olives.

In 2018 I completed a ground-breaking case study that measured the agricultural impact of existing wind farms in the Eastern Cape.

Soil Science Consultant Agricultural Consultants International (Tinie du Preez) 1998 - 2001

Responsible for providing all aspects of a soil science technical consulting service directly to clients in the wine, fruit and environmental industries all over South Africa, and in Chile, South America.

Contracting Soil Scientist De Beers Namaqualand Mines July 1997 - Jan 1998

Completed a contract to advise soil rehabilitation and re-vegetation of mined areas.

Publications

- Lanz, J. 2012. Soil health: sustaining Stellenbosch's roots. In: M Swilling, B Sebitosi & R Loots (eds). *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: SunMedia.
- Lanz, J. 2010. Soil health indicators: physical and chemical. *South African Fruit Journal*, April / May 2010 issue.
- Lanz, J. 2009. Soil health constraints. *South African Fruit Journal*, August / September 2009 issue.
- Lanz, J. 2009. Soil carbon research. *AgriProbe*, Department of Agriculture.
- Lanz, J. 2005. Special Report: Soils and wine quality. *Wineland Magazine*.

I am a reviewing scientist for the *South African Journal of Plant and Soil*.



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

APPENDIX 2: DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

File Reference Number:
NEAS Reference Number:
Date Received:

(For official use only)

DEA/EIA/

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

PROPOSED DEVELOPMENT OF 12 SOLAR PHOTOVOLTAIC (PV) FACILITIES (KUDU SOLAR FACILITIES 1 TO 12) AND ASSOCIATED INFRASTRUCTURE NEAR DE AAR, IN THE NORTHERN CAPE
--

Kindly note the following:

- This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
- This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
- A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
- All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
- All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address: Department of Environmental Affairs, Attention: Chief Director: Integrated Environmental Authorisations, Private Bag X447, Pretoria, 0001

Physical address: Department of Environmental Affairs, Attention: Chief Director: Integrated Environmental Authorisations, Environment House, 473 Steve Biko Road, Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Johann Lanz – Soil Scientist		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition
			100%
Specialist name:	Johann Lanz		
Specialist Qualifications:	M.Sc. (Environmental Geochemistry)		
Professional affiliation/registration:	Registered Professional Natural Scientist (Pr.Sci.Nat.) Reg. no. 400268/12 Member of the Soil Science Society of South Africa		
Physical address:	1a Wolfe Street, Wynberg, Cape Town, 7800		
Postal address:	1a Wolfe Street, Wynberg, Cape Town, 7800		
Postal code:	7800	Cell:	082 927 9018
Telephone:	082 927 9018	Fax:	Who still uses a fax? I don't
E-mail:	johann@johannlanz.co.za		

2. DECLARATION BY THE SPECIALIST

I, **Johann Lanz**, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Johann Lanz - Soil Scientist (sole proprietor)

Name of Company:

Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Johann Lanz**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Johann Lanz - Soil Scientist (sole proprietor)

Name of Company

Date

Signature of the Commissioner of Oaths

Date





herewith certifies that

Johan Lanz

Registration Number: 400268/12

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Soil Science (Professional Natural Scientist)

Effective **15 August 2012**

Expires **31 March 2024**



A handwritten signature in black ink, appearing to read 'A. V. ...'.

Chairperson

A handwritten signature in black ink, appearing to read 'N. ...'.

Chief Executive Officer



APPENDIX 4: PROJECTS INCLUDED IN CUMULATIVE IMPACT ASSESSMENT

DFFE Reference	CSIR Number on Map	Project Title	Technology	Capacity (MW)
12/12/20/2258	1	The Proposed Establishment of Photovoltaic (Solar Power) Farms in the Northern Cape Province - Kalkbult	Solar PV	75
12/12/20/2463/1	2	Longyuan Mulilo De Aar 2 North Wind Energy Facility	Wind	140
12/12/20/2463/2	3	Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility, and The Wind Energy Facility (North and South) Situated On The Plateau Near De Aar, Northern Cape Province	Wind	100
14/12/16/3/3/2/278	6	Proposed Castle Wind Energy Facility Project, located near De Aar, Northern Cape	Wind	118
14/12/16/3/3/2/564	7	Proposed Swartwater 75MW solar PV power facility in Petrusville within Renosterburg Local Municipality, Northern Cape	Solar PV	75
14/12/16/3/3/2/740	8	Proposed 300MW Solar Power Plant in Phillipstown area in Renosterberg Local Municipality	Solar PV	300
14/12/16/3/3/2/744	9	Proposed PV facility on farm Jakhalsfontein near De Aar	Solar PV	0
14/12/16/3/3/2/739	10	Proposed 70 - 100 MW Solar Power Plant in Petrusville	Solar PV	100
N/A (not available yet)	11	The Proposed Keren Energy Odyssey Solar PV Facilities (Odyssey Solar 1, Odyssey Solar 2, Odyssey Solar 3, Odyssey Solar 4, Odyssey Solar 5, Odyssey Solar 6, Odyssey Solar 7 And Odyssey Solar 8)	Solar PV	800
To be confirmed	12	The Proposed Development of the Crossroads (formally referred to as the Hydra B) Green Energy Cluster of Renewable Energy Facilities and Grid Connection Infrastructure	Solar PV	3050
<ul style="list-style-type: none"> • 14/12/16/3/3/2/2244 • 14/12/16/3/3/2/2245 • 14/12/16/3/3/2/2246 • 14/12/16/3/3/2/2247 • 14/12/16/3/3/2/2248 • 14/12/16/3/3/2/2249 • 14/12/16/3/3/2/2250 • 14/12/16/3/3/2/2251 • 14/12/16/3/3/2/2252 	No number but project study area is shown	Proposed Development of 12 Solar Photovoltaic (PV) Facilities (Kudu Solar Facility 1 to 12) and associated infrastructure, near De Aar, Northern Cape Province	Solar PV	2180

DFFE Reference	CSIR Number on Map	Project Title	Technology	Capacity (MW)
<ul style="list-style-type: none"> • 14/12/16/3/3/2/2253 • 14/12/16/3/3/2/2254 • 14/12/16/3/3/2/2255 				
• Total solar				6580
• Total wind				358
• Total				6938

Note: Power lines do not contribute to loss of agricultural land and are therefore not included in the calculation of affected area or the table above.




CHAPTER 7:

Terrestrial Biodiversity, Terrestrial Plant Species and Terrestrial Animal Species Assessment

**TERRESTRIAL BIODIVERSITY AND SENSITIVE PLANT AND ANIMAL SPECIES -
SPECIALIST ASSESSMENT:**

Scoping and Environmental Impact Assessment (EIA) Processes for the Proposed Development of the Kudu Solar Photovoltaic (PV) Facility 1 and associated infrastructure, near De Aar, Northern Cape province



<p><i>Report prepared for:</i> CSIR – Environmental Management Services P O Box 320 Stellenbosch 7599 South Africa</p>	<p><i>Report prepared by:</i> Enviro-Insight CC 862 Wapadrand Rd Wapadrand Security Village 0050 South Africa</p>	
--	---	---

Version 1: May 2023
Version 2: July 2023

Executive Summary

Enviro-Insight CC was appointed by the CSIR to conduct the Terrestrial Biodiversity and Sensitive Plant and Animal Species Assessments for the proposed development by ABO Wind renewable energies (PTY) Ltd (hereinafter referred to as ABO Wind) of Solar Facilities, collectively referred to as Kudu. The proposed projects will make use of PV solar technology to generate electricity from energy derived from the sun. Each solar PV facility will have a range of associated infrastructure, including, but not limited to, an on-site substation complex, battery energy storage systems (BESS) and is proposed to connect to an existing 400 kV power line via dedicated 132 kV power lines. Separate specialist reports have been provided for each PV project. This report is focused on **Kudu Solar Facility 1** only.

The study area for the proposed Kudu Solar Facilities 1 to 12 is the full extent of the eight affected farm properties on which the proposed PV Facilities will be constructed. The total study area for all the Kudu Solar Facilities 1 to 12 is approximately 8 150 hectares (ha).

The study area is located in the Northern Upper Karoo (NKu3) vegetation types, in an Ecological Support Area (ESA) and in the Platberg-Karoo Conservancy, which is a protected area (not formally)¹ as well as Important Bird and Biodiversity Areas (IBA). NKu3 is listed as Least Threatened with a conservation target of 21%, however it is hardly protected with no areas conserved in statutory conservation areas. The ESA is due to the study area being located in the Platberg-Karoo Conservancy, the vegetation units and important wetland and river features. From a Terrestrial Biodiversity perspective, the Platberg-Karoo Conservancy and the vegetation units are important systems for grasslands and grassland associated animals, as well as important areas for the conservation of avifauna.

The findings of the site verification confirmed medium sensitivity for Terrestrial Biodiversity, and Low sensitivity for both the Animal Species Theme (excluding avifauna) and Plant Species Themes. For Terrestrial biodiversity, the overall sensitivity of the site is considered Medium overall, with some landscape features, including the Koppies, wetlands and main river courses as High sensitivity. These features need to be excluded from development as identified by the relevant specialists (refer to aquatic and avifauna assessments in Chapters 8 and 9 of this EIA Report, respectively).

Two main habitats were identified based on species composition and structure, namely 'Shrubby Grassland' and 'Watercourse'. The Shrubby Grassland has elements of shrubs and low trees, and white grasses dominating the lower layer (*Aristida* sp. and *Eragrostis* sp.). This habitat is more characteristic of the Eastern Upper Karoo due to dwarf microphyllous shrubs with a dominant grass layer. It can even be described as an ecotone between the two vegetation units, with some elements of the Besemkaree Koppies shrubland as well. This habitat is considered moderately sensitive due to moderate species diversity and the presence of provincially protected species. The Watercourse habitat consists of drainage lines, some of which are smaller and poorly developed. The vegetation layer is not well-defined and is made up of woody cover in some areas but is mostly dominated by graminoids and herbaceous species. The habitat acts as a landscape corridor for the movement of many fauna species, including small mammals such as hares. It also performs important ecosystem functions such as regulating water runoff and creating suitable conditions important for the survival of many fauna species including foraging and breeding habitat. Accordingly, it is considered as high sensitivity in regard to ecosystem functioning and should therefore be protected.

No SCC were recorded for this site. Provincially protected species (NORTHERN CAPE NATURE CONSERVATION ACT NO. 9 OF 2009) include *Aloe broomii*, *Jamesbrittenia tysonii* and *Ruschia intricata*. Where the proposed development impact on these species, a permit application from the provincial department is required for relocation to suitable, undisturbed areas.

¹ A conservancy is a vehicle and platform for community-based conservation. It is a voluntary association of environmentally conscious land-owners and land-users who choose to cooperatively manage their natural resources in an environmentally sustainable manner without necessarily changing the land-use of their properties.

The proposed development consists of twelve solar PV facilities and associated infrastructure. Several impacts may result from the project activities, including:

- During the pre-construction phase, vegetation will be removed for the laydown area, access roads and other infrastructure as part of ground preparation. This will result in habitat loss and fragmentation.
- The proposed solar facilities consist of numerous solar panels covering most of the site. It should be noted that the area proposed for the development of all 12 solar PV facilities is approximately 3268 ha (i.e., area covered by the PV array and associated infrastructure). However, the entire site will not be cleared of vegetation. Not all vegetation will be cleared underneath the solar PV panels, but species structure and composition will likely change.
- The proposed solar panels will be mounted to maximise the amount of sunlight. This will result in maximum shading of the surroundings, and accordingly smaller, sensitive plants could be impacted on.
- As the solar panels are impervious to rain, the water will run off the panels which could increase soil erosion and runoff. Water should be collected in swales or similar stormwater design measures where necessary.
- Soil disturbance will take place as the solar panels are mounted on poles that must be firmly embedded in the soil to prevent collapse.

All the impacts assessed can be reduced through avoidance and mitigation measures. There are no residual impacts anticipated and accordingly the project can proceed, but only if sensitive areas are avoided, and the proposed mitigation measures are implemented. Some impacts such as habitat loss and ecological functioning cannot be avoided, but the overall impact for this vegetation type is medium to low significance post mitigation.

The proposed development is not located in a threatened vegetation type or ecosystem and is located in an ESA mainly due to presence of sensitive birds and watercourses. There are no high sensitivity features on site for Kudu Solar Facility 1, and no plant SCC were recorded. However, three provincially protected species occur on Kudu Solar Facility 1 and requires permits for relocation from the provincial authority.

The development of Kudu Solar Facility 1 can proceed should all no-go sensitive areas be avoided, and the recommended mitigation measures are implemented.

Contents

Executive Summary	2
TERRESTRIAL BIODIVERSITY AND SENSITIVE PLANT AND ANIMAL SPECIES ASSESSMENT ...	8
1. Introduction	8
1.1 Scope, Purpose and Objectives of this Specialist Input to the Scoping Report	8
1.2 Details of Specialist	9
1.3 Terms of Reference	9
2. Approach and Methodology	10
2.1 Information Sources	10
2.2 Habitats	11
2.3 Site visit	11
2.4 Site Ecological Importance (SEI)	12
2.5 Assumptions, Knowledge Gaps and Limitations	14
3. Description of Project Aspects relevant to Terrestrial Biodiversity and Plant and Animal Species Assessment	14
4. Baseline Environmental Description	14
4.1 Study Area Definition	14
4.2 General Description	15
4.2.1 Regional Vegetation	15
4.2.2 Northern Cape Conservation Plan	16
4.2.3 Important Bird and Biodiversity Areas, and Protected Areas	18
4.2.4 Current Impacts	19
4.3 Project Specific Description	20
4.3.1 Solar Facility 1 and associated infrastructure	23
4.4 Identification of Environmental Sensitivities	23
4.4.1 Sensitivities identified by the National Web-Based Environmental Screening Tool	23
4.4.2 Specialist Sensitivity Analysis and Verification	26
4.4.3 Sensitivity Analysis Summary Statement	29
5. Alternative Development Footprints	29
6. Issues, Risks and Impacts	30
6.1 Identification of Potential Impacts/Risks	30
6.2 Cumulative Impacts	32
6.3 Summary of Issues identified during the Public Consultation Phase	36
7. Impact Assessment	41
7.1 Potential Impacts during the Construction Phase	41
7.2 Potential Impacts during the Operational Phase	43
7.3 Potential Impacts during the Decommissioning Phase	45
7.4 Cumulative Impacts	47
7.5 Battery Energy Storage System	47

7.6	No-Go Alternative.....	48
8.	Impact Assessment Summary	48
9.	Legislative and Permit Requirements	49
10.	Environmental Management Programme Inputs	50
	Management Plan for the Construction Phase (Including pre- and post-construction activities)	50
	Management Plan for the Operational Phase.....	59
	Management Plan for the Decommissioning Phase.....	62
11.	Final Specialist Statement and Authorisation Recommendation	63
11.1	Statement and Reasoned Opinion	63
11.2	EA Condition Recommendations	63
12.	References	64
Appendix A: Specialist Expertise.....		66
Appendix B: Specialist Statement of Independence.....		69
Appendix C: Site Sensitivity Verification.....		75
Appendix D: Impact Assessment Methodology		77
Appendix E: Animal Compliance Statement		81

List of Figures

Figure 1-1:	Regional location of the affected farm portions on which the proposed Kudu Solar PV Facilities will be constructed. These entire farm portions (outlined in black) are the study area for the 12 PV Facilities. Separate Environmental Assessment processes will be undertaken for the grid connection of the proposed projects (i.e. power lines, switching stations, and Main Transmission Station).....	8
Figure 2-1:	GPS tracks and georeferenced photographs taken for the study area. Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.....	12
Figure 4-1:	Locality of the Project in relation to the Vegetation units (SANBI, 2018). Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.....	15
Figure 4-2:	Locality of the Project in relation to the Northern Cape CBA Map (2016). Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.	17
Figure 4-3:	Locality of the Project in relation to the Platberg-Karoo Conservancy. Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.....	19
Figure 4-4:	Current impacts of the study area. A = Windpump and waterpoint; B = Fenced camp with planted Eucalyptus and water point; C = Powerlines; D = Planted Opuntia; E = Livestock; and F = Abandoned structure.....	20
Figure 4-5:	Main habitats identified for the study area.....	21
Figure 4-6:	Typical Shrubby Grassland habitat which are dominated by <i>Searsia</i> spp. and grasses.	22
Figure 4-7:	Watercourse habitat throughout the study area.	22
Figure 4-9:	Map of relative Terrestrial Biodiversity theme sensitivity.	25
Figure 4-10:	Map of relative Plant Species theme sensitivity.	26
Figure 4-11:	Sensitivity map for PV sites 1-12.....	28

Figure 6-1: Map illustration of the proposed renewable energy projects, located within 30 km of the proposed Kudu Solar Facilities, considered in the Cumulative Impact Assessment (in addition to the Kudu Solar Facilities) (Source: DFFE REEA, Quarter 4, 2022; and SAHRIS). 33

List of Tables

Table 4-1: Attributes of the Northern Upper Karoo vegetation type (Mucina and Rutherford, 2006).	16
Table 4-2: Summary of observed occurrence of plant SCC within the proposed development footprint showing status as Provincially Protected (PP) and Protected Tree (PT) with proposed actions and estimated number of specimens.	23
Table 6-1: Proposed renewable energy projects, located within 30 km of the proposed Kudu Solar Facilities, considered in the Cumulative Impact Assessment (Source: DFFE REEA, Quarter 4, 2022; and SAHRIS).....	34
Table 6-2: Comments Received from Stakeholders during the Public Consultation Phase.....	37
Table 7-1: Potential Impacts during the Construction Phase.....	42
Table 7-2: Potential Impacts during the Operational Phase.	44
Table 7-3: Potential Impacts during the Decommissioning Phase.	46
Table 7-4: Cumulative Impacts.	47
Table 8-1: Terrestrial Biodiversity - Overall Impact Significance (Post Mitigation).....	48

Abbreviations

CBA	Critical Biodiversity Area
CI	Conservation Importance
DAEARDLR	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform: Northern Cape
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FI	Functional integrity
IUCN	International Union for Conservation of Nature
NCNCA	Northern Cape Nature Conservation Act
NFA	National Forest Act (Act 84 of 1998)
NSBA	National Spatial Biodiversity Assessment
PP	Provincially Protected
PT	Protected Tree
PV	Photovoltaic
SCC	Species of conservation concern
SEI	Site Ecological Importance

Definitions

Alien Invasive Species – plants or animals that are introduced by humans, accidentally or intentionally, outside of their natural geographic range into an area where they are not naturally present.

Critical Biodiversity Area (CBA) – an area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets.

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]). The importance of a site for supporting biodiversity features of conservation concern present, e.g. populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.

Cumulative impact – 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.

Ecotone – a transition area between two habitat types or where two communities meet and integrate. It may be narrow or wide, and it may be local or regional

Endemic – a species that is naturally restricted to a particular, well-defined region.

Functional integrity (FI) of the receptor (e.g. the vegetation/ fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is: *'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'*

IUCN Red List status – the conservation status of species, based on the IUCN Red List categories and criteria.

Rare species are those included on South Africa's National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat.

Range-restricted species – the presence of terrestrial flora, vertebrate and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km² or less.

Receptor resilience (RR) – The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.

Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

Species of conservation concern (SCC) – includes all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare].

For plants, species of conservation concern are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD) (<http://redlist.sanbi.org/redcat.php>).

TERRESTRIAL BIODIVERSITY AND SENSITIVE PLANT AND ANIMAL SPECIES ASSESSMENT

This Chapter includes the **Terrestrial Biodiversity and Sensitive Plant and Animal Species Assessments** that was prepared by Mr Corné Niemandt as part of the Scoping and Environmental Impact Assessment (S&EIA) proposed development of the Kudu Solar Photovoltaic (PV) Facilities and associated infrastructure, near De Aar, Northern Cape Province. The Animal Compliance Statement is attached as Appendix E to this report.

1. Introduction

1.1 Scope, Purpose and Objectives of this Specialist Report

Enviro-Insight CC was appointed by the CSIR to conduct the Terrestrial Biodiversity and Sensitive Plant and Animal Species Assessments for the proposed development by ABO Wind renewable energies (PTY) Ltd (hereinafter referred to as ABO Wind) of Solar Facilities, collectively referred to as Kudu. The proposed projects will make use of PV solar technology to generate electricity from energy derived from the sun. Each solar PV facility will have a range of associated infrastructure, including, but not limited to, an on-site substation complex, battery energy storage systems (BESS) and is proposed to connect to an existing 400 kV power line via dedicated 132 kV power lines. Separate specialist reports have been provided for each PV project. This report is focused on **Kudu Solar Facility 1** only.

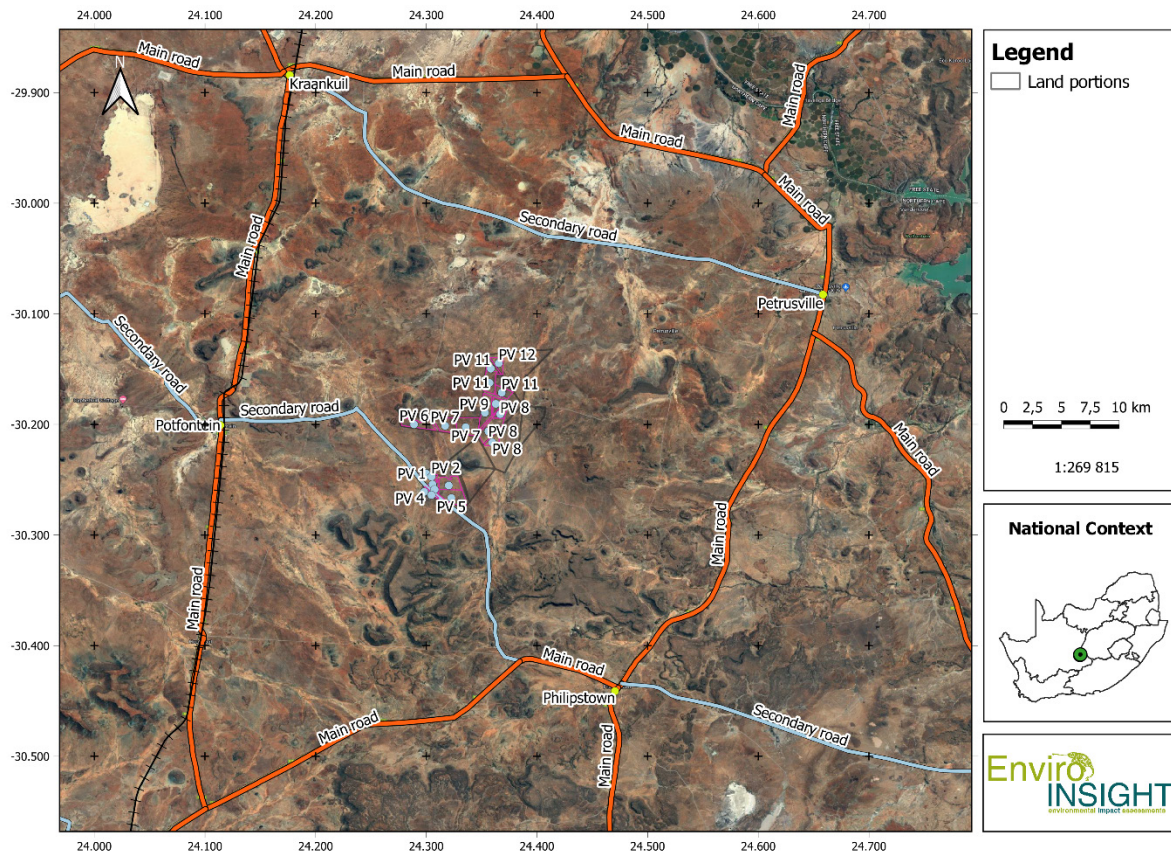


Figure 1-1: Regional location of the affected farm portions on which the proposed Kudu Solar PV Facilities will be constructed. These entire farm portions (outlined in black) are the study area for the 12 PV Facilities. Separate Environmental Assessment processes will be undertaken for the grid connection of the proposed projects (i.e. power lines, switching stations, and Main Transmission Station).

1.2 Details of Specialist

This specialist assessment has been undertaken by Corné Niemandt of Enviro-Insight CC. Corné has a MSc in Plant Science (University of Pretoria, 2015) and is professionally registered with the South African Council for Natural and Scientific Professions (SACNASP), with Registration Number 116598 in the field of Ecological Science. His curriculum vitae is included in Appendix A of this specialist report. In addition, a signed specialist statement of independence is included in Appendix B of this specialist report.

1.3 Terms of Reference

The Terms of Reference (TOR) ensures a consistent and up-to-date approach by the specialist in order to be compliant as required as part of the Environmental Impact Assessments (EIAs) being conducted for these projects. This will enable efficient review and collation of the specialist studies into the Scoping and EIA Reports, in accordance with the latest requirements of the 2014 EIA Regulations (as amended) in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA).

The following TOR was provided:

- Comply with the Assessment Protocols that were published on 20 March 2020, in Government Gazette 43110, GN 320. This specifically includes the Terrestrial Biodiversity Protocol that applies to all activities requiring EA.
- Comply with the Assessment Protocols that were published on 30 October 2020, in Government Gazette 43855, GN 1150. This specifically includes the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species and terrestrial plant species.
- Provide a Terrestrial Biodiversity and Species Specialist Report or Compliance Statement based on the requirements documented in the Assessment Protocols published on 20 March 2020, in Government Gazette 43110, GN 320, and 30 October 2020, in Government Gazette 43855, GN 1150.
- The Specialist Assessment and/or Compliance Statement must also be in adherence to any additional relevant legislation and guidelines that may be deemed necessary. In addition, it must comply with the 2014 NEMA EIA Regulations (as amended), where applicable.
- Provide inputs to the Draft and Final Scoping Reports such as a description of the affected environment and environmental sensitivities, key legislation, key issues to be addressed during the EIA Phase, high level assessment of impacts, and confirmation of scope of work for the EIA Phase.
- The specialist must undertake a site visit in order to identify the level of sensitivity assigned to the project area on the Screening Tool, and to verify and confirm this sensitivity and land-use and either compile a Terrestrial Biodiversity and Species Specialist Report or Compliance Statement, as documented in the Assessment Protocols published on 20 March 2020, in Government Gazette 43110, GN 320, and 30 October 2020, in Government Gazette 43855, GN 1150.
- Determination, description and mapping of the baseline environmental condition and sensitivity of the study area. Specify set-backs or buffers, and provide clear reasons for these recommendations. Also map the extent of disturbance and transformation of the site.
- Provide review input on the preferred infrastructure layout following the sensitivity analysis and layout identification.
- Describe the terrestrial ecology features of the project area, with focus on features that are potentially impacted by the proposed project. The description should include the major habitat forms within the study site, giving due consideration to terrestrial ecology (flora) and terrestrial ecology (fauna).
- Consider seasonal changes and long-term trends, such as due to climate change.
- Identify any species of conservation concern (SCC) or protected species on site (e.g. protected tree and provincially protected species).
- The assessment is to be based on existing information, national and provincial databases, and professional experience and a field work conducted by the specialist, as considered necessary and

in accordance with relevant legislated requirements. The assessment must also consider the maps generated by the National Screening Tool.

- Identify and assess the potential direct, indirect and cumulative impacts of the proposed development on terrestrial biodiversity and species. Impact significance must be rated both without and with mitigation, and must cover the construction, operational and decommissioning phases of the project.
- Identify any protocols, legal and permit requirements that are relevant to this project and the implications thereof.
- Provide recommendations with regards to potential monitoring programmes.
- Determine mitigation and/or management measures which could be implemented to as far as possible reduce the effect of negative impacts and enhance the effect of positive impacts. Also identify best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts. This must be included in the EMP. Incorporate and address all issues and concerns raised by Stakeholders, Competent Authority, I&APs and the public during the Public Participation Process (where relevant and applicable).

2. Approach and Methodology

This assessment complies with the requirements of the Terrestrial Biodiversity Protocol published in GN 320 in March 2020, as well as the Terrestrial Plant Species Protocol and Terrestrial Animal Species Protocol published in GN 1150 in October 2022.

2.1 Information Sources

Existing data layers were incorporated into a GIS to establish how the proposed study areas and associated activities interact with important terrestrial entities. Emphasis was placed on the following spatial datasets:

Data / Information	Source	Date	Type	Description
South African National Protected Areas Database (SAPAD)	Department of Forestry, Fisheries and the Environment (DFFE) Directorate: Spatial Information Management	2022, Q3	Spatial	Spatial delineation of protected areas in South Africa. Updated quarterly
South Africa Conservation Areas Database (SACAD)	DFFE Directorate: Spatial Information Management	2022, Q3	Spatial	Spatial delineation of conservation areas in South Africa. Updated quarterly
Northern Cape Critical Biodiversity Areas	Northern Cape Department of Environment and Nature Conservation	2016	Report & Spatial	Spatial conservation planning units and associated management recommendations for the Northern Cape province
National Biodiversity Assessment (NBA)	South African National Biodiversity Institute	2018	Report and Spatial	Latest assessment of South African biodiversity and ecosystems, including, vegetation types, wetlands and rivers.
National Vegetation Map (VEGMAP)	South African National Biodiversity Institute	2018	Spatial	Classify, map and sample the vegetation of South Africa, important for environmental planning, conservation management, biodiversity assessment and research in the floristically diverse region of southern Africa.

A literature review was conducted as part of the desktop study to identify the potential habitats and flora SCC present within the study area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA) (SANBI, 2022²), to access distribution records on southern African plants³. This is a new database which replaces the old Plants of Southern Africa (POSA) database. The POSA database provided distribution data of flora at the quarter degree grid cell (QDGC) resolution; however, the BODATSA database provides distribution data as point coordinates. The literature assessment, therefore, focussed on querying the database to generate species lists for the immediate study area and surroundings. A list of 281 species was generated on 21 February 2022 in order to increase the likelihood of obtaining a representative species list for the proposed study area.

The Red List of South African Plants website (SANBI, 2022)⁴ was utilized to provide the most current account of the national status of flora. Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Guide to grasses of southern Africa (Van Oudtshoorn, 2014);
- Field guide to succulents of southern Africa (Smith *et al.* 2017);
- Field guide to wild flowers of South Africa (Manning, 2019);
- Problem plants and alien weeds of South Africa (Bromilow, 2019);
- Field guide to trees of southern Africa (Van Wyk & Van Wyk, 2013), and
- *TheTreeApp* South Africa (High Branching Pty (Ltd)).

Additional information regarding ecosystems, vegetation types, and SCC included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006 as amended),
- Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2022),
- iNaturalist (<https://www.inaturalist.org/>).

The Animal Compliance Statement is attached as Appendix E to this report.

2.2 Habitats

The habitats present on the study area were ground-truthed by the botanist during fieldwork. Using recent cloud free satellite imagery (Sentinel 2, S2_SR/20201014T080909_20201014T083111_T34JFN), training polygons were created for the different habitats identified. These habitats included: 'White Grassland', 'Shrubby Grassland', 'Watercourse', 'Koppies', and 'Transformed'. These were used to train a smileCART classifier in Google Earth Engine using the following S2 bands 'B2', 'B3', 'B4','B5', 'B6', 'B7', 'B8', 'B11'. A majority filter with a circle search mode, 2-pixel radius and 0 % threshold were applied to the output raster file to consolidate sliver habitats. This raster was then converted to a vector shapefile.

This delineation was performed at a high resolution to include as much detail as possible, but this also results in small or scattered areas being classified as sensitive. Sometimes these areas contain elements of the sensitive habitat, other times it may result from misclassification due to similarities in spectral properties between habitat types. Therefore, we must interpret these delineations with this in mind. Large, intact areas of sensitive habitat should be regarded as highly sensitive, while small and or patchy areas are less important to avoid as they either represent non-sensitive habitat or are fragmented and of lower functional quality.

2.3 Site visit

A site visit was undertaken from 21-25 February 2022 and 2-3 March 2022 (wet season) by an ecologist where the Terrestrial Biodiversity and sensitive flora aspects of the survey area were evaluated. During the field surveys performed, the habitats were evaluated on foot and a series of georeferenced photographs were

² <http://newposa.sanbi.org/>

³ Data are obtained from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH)

⁴ <http://redlist.sanbi.org/>

taken of the habitat attributes (Figure 2-1). The field surveys focused on identifying dominant flora species, main habitat types as well as the actual and potential presence of SCC (either classified as Threatened by the International Union for Conservation of Nature (IUCN) (2022), protected by the National Environmental Management: Biodiversity Act (NEMBA) (2007, as amended) or other legislation applicable provincially or nationally).

Refer to the site sensitivity verification report in Appendix C of this report.

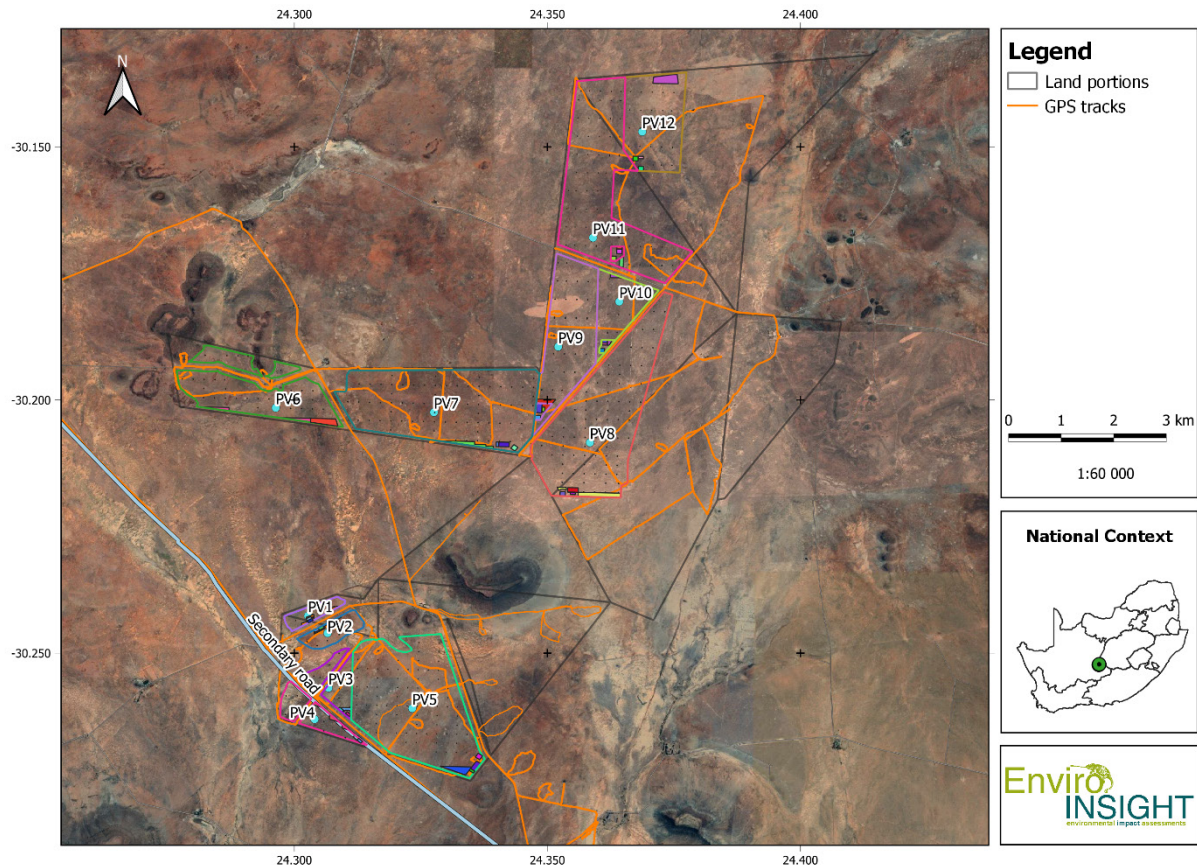


Figure 2-1: GPS tracks and georeferenced photographs taken for the study area. Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.

2.4 Site Ecological Importance (SEI)

The Terrestrial Plant Species Protocol requires specialists to identify:

- the nature and the extent of the potential impact of the proposed development on SCC occurring on the proposed development site;
- the potential impact of the proposed development on the habitat of the SCC; and
- any alternative development footprints within the preferred development site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification.

While most of the features that will be included in the conservation importance (CI) will be provided by the screening tool, it is important to note that CI is evaluated at a **much finer spatial scale** and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the Environmental Authorisation (EA) process.

SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]) as follows:

$$SEI = BI + RR$$

BI in turn is a function of CI and the functional integrity (FI) of the receptor as follows:

$$BI = CI + FI$$

As BI is a function of CI and the FI of a receptor, BI can be derived from a simple matrix of CI and FI as follows:

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

From the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows:

Site ecological importance		Biodiversity importance				
		Very high	High	Medium	Low	Very low
Receptor resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

The SEI in relation to proposed development activities can be interpreted as follows:

- **Very High:** Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
- **High:** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
- **Medium:** Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
- **Low:** Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
- **Very Low:** Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

For a full breakdown of the SEI methodology please refer to SANBI V3.1 (2020).

2.5 Assumptions, Knowledge Gaps and Limitations

- It is assumed that all third-party information acquired is correct (e.g., GIS data and scope of work).
- The survey was conducted in the wet season. Due to the heavy rains received in the 2021/2022 summer period, the grass layer was well-developed, meaning it was tall and dense.
- Due to the nature of most biophysical studies, it is not always possible to cover every square metre of a given study area. Due to the large study area, it is possible that small individual plant SCC may have been overlooked even though care has been taken to search for specific SCC.
- The literature review for plant species identified several limitations in the use of online data platforms.

3. Description of Project Aspects relevant to Terrestrial Biodiversity and Plant and Animal Species Assessment

The proposed development consists of twelve solar PV facilities and associated infrastructure. Several impacts may result from the project activities, including:

- During the pre-construction phase, vegetation will be removed for the laydown area, access roads and other infrastructure as part of ground preparation. This will result in habitat loss and fragmentation.
- The proposed solar facilities consist of numerous solar panels covering most of the site. It should be noted that the area proposed for the development of all 12 solar PV facilities is approximately 3268 ha (i.e., area covered by the PV array and associated infrastructure). However, the entire site will not be cleared of vegetation. Not all vegetation will be cleared underneath the solar PV panels, but species structure and composition will likely change.
- The proposed solar panels will be mounted to maximise the amount of sunlight. This will result in maximum shading of the surroundings, and accordingly smaller, sensitive plants could be impacted on.
- As the solar panels are impervious to rain, the water will run off the panels which could increase soil erosion and runoff. Water should be collected in swales or similar stormwater design measures where necessary.
- Soil disturbance will take place as the solar panels are mounted on poles that must be firmly embedded in the soil to prevent collapse.

4. Baseline Environmental Description

4.1 Study Area Definition

The study area for the proposed Kudu Solar Facilities 1 to 12 is the full extent of the eight affected farm properties on which the proposed PV Facilities will be constructed. The full extent of these properties has been assessed in this study in order to identify environmental sensitivities and no-go areas. The total study area for all the Kudu Solar Facilities 1 to 12 is approximately 8 150 hectares (ha).

At the commencement of this Scoping and EIA Process, the Original Scoping Buildable Areas which fall within the study area were identified by the Project Developer following the completion of high-level environmental screening based on the Screening Tool.

Following the identification of sensitivities during the Scoping Phase, the Project Developer considered such sensitivities and formulated the Revised Scoping Buildable Areas. The Revised Scoping Buildable Areas were used to inform the design of the layout and further assessed during this EIA Phase of the project in order to identify the preferred development footprint of the proposed project on the approved site as contemplated in the accepted Scoping Report. The development footprint is where the actual development will be located, i.e. the footprint containing the PV solar arrays and associated infrastructure.

4.2 General Description

4.2.1 Regional Vegetation

According to Mucina & Rutherford (2006, as amended), Kudu PV1 is located in the Northern Upper Karoo (NKu3) vegetation type (Figure 4-1). The majority of the overall study area (PV1-2 and PV6-12 with some sections of PV3 and PV5) is located in the Northern Upper Karoo, while portions of PV3 and PV5 and the entire PV4 are located in the Eastern Upper Karoo. The Besemkaree Koppies Shrubland are embedded between the two mentioned vegetation units, with a small section of PV6 overlapping it.

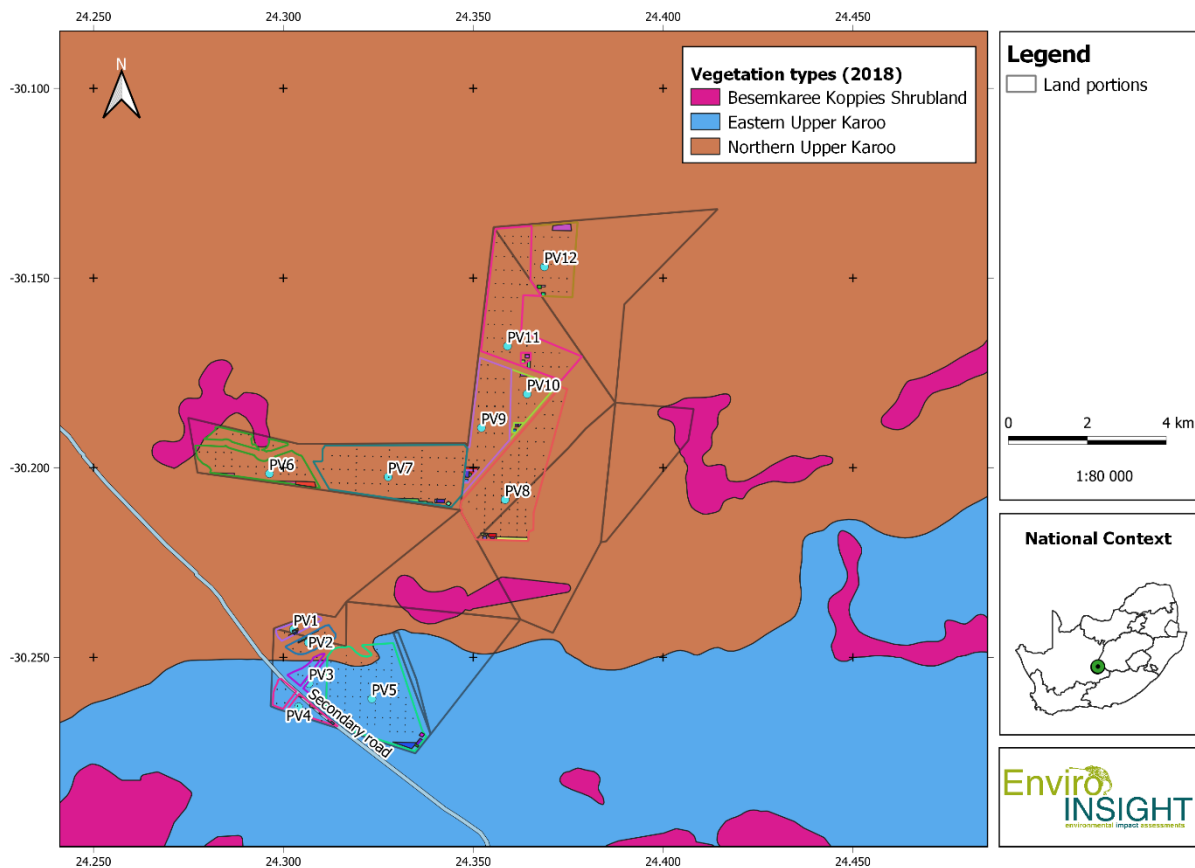


Figure 4-1: Locality of the Project in relation to the Vegetation units (SANBI, 2018). Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.

The Northern Upper Karoo vegetation unit (Table 4-1) occupies the Northern regions of the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Philipstown, Petrusville and Petrusburg in the east. Bordered in the north by Niekerkshoop, Douglas and Petrusburg and in the south by Carnarvon, Pampoenpoort and De Aar. A few patches occur in Griqualand West.

The landscape typifying this vegetation type is flat to gently sloping plains with isolated Koppies of Upper Karoo Hardeveld in the south, Vaalbos Rocky Shrubland in the northeast and interspersed with many pans (Mucina & Rutherford 2006). The Shrubland is dominated by dwarf karoo shrubs, grasses and mainly *Senegalia mellifera subsp. detinens*. Bioregional important taxa and endemic species include: *Atriplex spongiosa*, *Convolvulus boedeckerianus*, *Galenia exigua*, *Lithops hookeri*, *Stomatium pluridens*, *Manulea deserticola*.

Shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both of the Ecca Group) as well as Dwyka Group diamictites form the underlying geology. Jurassic Karoo Dolerite sills and sheets support this vegetation complex in places. Wide stretches of land are covered by superficial

deposits including calcretes of the Kalahari Group. Soils are variable from shallow to deep, red-yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms.

The conservation target is 21% with no areas conserved in statutory conservation areas. About 4% has been cleared for cultivation (the highest proportion of any type in the Nama-Karoo) or irreversibly transformed by building of dams (for example, Houwater, Kalkfontein and Smart Syndicate Dams). Areas of human settlements are increasing in the north-eastern part of this vegetation type. *Prosopis glandulosa*, regarded as one of the most important invasive alien plants in South Africa, is widely distributed in this vegetation type (Mucina & Rutherford 2006).

Table 4-1: Attributes of the Northern Upper Karoo vegetation type (Mucina and Rutherford, 2006).

Name of vegetation type	Northern Upper Karoo
Code as used in the Book	Northern Upper Karoo
Conservation Target (percent of area) from NSBA ⁵	NKu3
Protected (percent of area) from NSBA	21%
Remaining (percent of area) from NSBA	0%
Description of conservation status from NSBA	96.6%
Description of the Protection Status from NSBA	Least threatened
Area (km ²) of the full extent of the Vegetation Type	Hardly protected
Name of the Biome	41829.17
Name of Group and Bioregion	Nama-Karoo Biome

4.2.2 Northern Cape Conservation Plan

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole (Holness & Oosthuysen, 2016). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes.

CBAs are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBAs is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. Biodiversity priority areas are described as follows:

- *Critical biodiversity areas (CBAs)* are 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 conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBAs the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g., loss of populations or habitat). All Freshwater

⁵ National Spatial Biodiversity Assessment (NSBA)

Ecosystem Priority Area (FEPA) prioritized wetlands and rivers have a minimum category of CBA1, while all FEPA prioritised wetland clusters have a minimum category of CBA2.

- *Ecological support areas (ESAs)* are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for CBAs. For ESAs a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity). All natural non-FEPA wetlands and larger rivers have a minimum category of ESA.

The study area is located in an ESA (Figure 4-2). The ESA is due to the study area being located in the Platberg-Karoo Conservancy, the vegetation units and important wetland and river features. From a Terrestrial Biodiversity perspective, the Platberg-Karoo Conservancy and the vegetation units are important systems for grasslands and grassland associated animals, as well as important areas for the conservation of avifauna. This section of the Karoo has the highest rainfall, and provides an ecotone between the Nama Karoo and Grassland biomes. Accordingly, all developments within this ESA must undergo EA processes, where impacts are assessed and appropriate mitigation measures provided to lower the significance of negative impacts and enhance positive impacts, where appropriate. More information on the Platberg-Karoo Conservancy is provided in the next section.

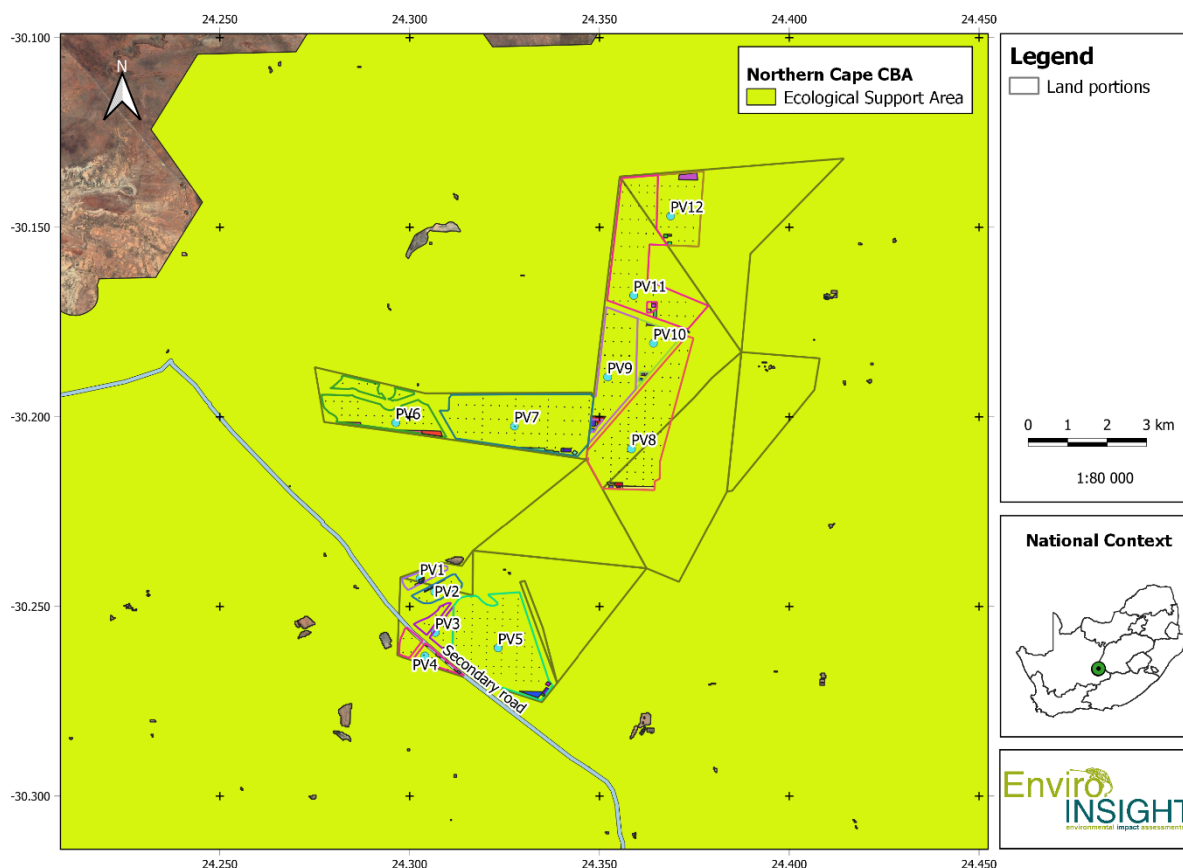


Figure 4-2: Locality of the Project in relation to the Northern Cape CBA Map (2016). Note that the overhead power lines and grid corridor are the subject of a separate Environmental Assessment Process.

4.2.3 Important Bird and Biodiversity Areas, and Protected Areas

The study area is located in the Platberg-Karoo Conservancy, which is a protected area (not formally)⁶ as well as Important Bird and Biodiversity Areas (IBA) (Figure 4-3). The only formally conserved reserve in the area is the small government owned Rolfontein Nature Reserve (6,938 ha) in the north-east.

The Platberg–Karoo Conservancy was established in July 1990. In collaboration with MD Anderson of DENC, various research and environmental awareness projects were initiated, including the Karoo Large Terrestrial Bird Survey, the Blue Crane Awareness Project and 11 years of colour-ringing Blue Crane chicks. The major threat of power-line collisions was initially investigated by the Eskom/EWT partnership and MD Anderson. This covered the impact of power lines on populations of large terrestrial bird species and evaluated the effectiveness of earth-wire marking devices.

The Platberg–Karoo Conservancy IBA covers the entire districts of De Aar, Philipstown and Hanover, including suburban towns. The landscape consists of extensive flat to gently undulating plains that are broken by dolerite hills and flat-topped inselbergs. The ephemeral Brak River flows in an arc from south-east to north-west, eventually feeding into the Orange River basin. Other ephemeral rivers include the Hondeblaf, Seekoei, Elandsfontein and Ongers rivers with a network of tributaries. Vanderkloof Dam is on the north-eastern boundary.

This IBA is in the Nama Karoo and Grassland Biomes. The eastern Nama Karoo has the highest rainfall of all the Nama Karoo vegetation types and is thus ecotonal to grassland, with a complex mix of grass- and shrub-dominated vegetation types. Eight broad vegetation types are present; seven are Least Threatened and the Upper Gariiep Alluvial Vegetation type is classified as Vulnerable. In addition to sensitive avifauna species, Aardwolf *Proteles cristatus*, aardvark *Orycteropus afer*, bat-eared fox *Otocyon megalotis* and black-footed cat *Felis nigripes* (Vulnerable) are present.

The land is used primarily for grazing and agriculture. Commercial livestock farming is mostly extensive wool and mutton production, with some cattle and game farming. Less than 5% of this IBA is cultivated under dry-land or irrigated conditions and includes lucerne and prickly pear *Opuntia ficus-indica* orchards. Threats in the area include overgrazing, which results in a depletion of palatable plant species, erosion, and encroachment by Karoo shrubs. The result is loss of suitable habitat and a decrease in the availability of food for large terrestrial birds. Centre-pivot irrigated croplands using underground water are increasing and agriculture is intensifying.

Renewable energy developments are a new threat. About 20 applications for EA have been submitted according to the South African Renewable Energy EIA Application Database (REEA_OR_2022_Q2, DFFE 2022) of which thirteen wind and solar developments have been approved for development within this IBA (<https://www.birdlife.org.za/iba-directory/platberg-karoo-conservancy/>). All the large trigger species are highly susceptible to collisions with wind turbines. All the trigger species are predicted to be moderately susceptible to the various impacts of solar-energy facilities.

⁶ A conservancy is a vehicle and platform for community-based conservation. It is a voluntary association of environmentally conscious land-owners and land-users who choose to cooperatively manage their natural resources in an environmentally sustainable manner without necessarily changing the land-use of their properties.