



Scoping and Environmental Impact Assessment for the proposed
Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR
PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of
Kenhardt, Northern Cape Province



EIA Report

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March 2016



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on Remaining Extent of Boven Rugzeer Farm 169, Northern Cape Province

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

CSIR Report Number: CSIR/CAS/EMS/ER/2015/0017/B

March 2016

Prepared for:

Mulilo Renewable Project Developments

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REPORT DETAILS

Title:	Scoping and Environmental Impact Assessment for the proposed development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province
Prepared for:	<p>This Environmental Impact Assessment (EIA) Report forms part of a series of reports and information sources that are being provided during the EIA Process for the proposed Boven Solar PV4 project. In accordance with the 2014 NEMA EIA Regulations, the purpose of the EIA Report is to:</p> <ul style="list-style-type: none"> • Present the details of and need for the proposed project; • Describe the affected environment, including the planning context, at a sufficient level of detail to facilitate informed decision making; • Provide an overview of the EIA Process being followed, including public consultation; • Assess the predicted positive and negative impacts of the project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; • Provide an Environmental Management Programme (EMPr) for the design, construction and operational phases of the project. <p>The EIA Report is being made available to all stakeholders for a 30-day review period. All comments on the EIA Report (submitted within the 30-day review period) will be considered in the preparation of the finalised EIA Report. This finalised EIA Report will then be submitted to the National Department of Environmental Affairs (DEA), in accordance with Regulation 23 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 24 of the 2014 NEMA EIA Regulations..</p>
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EXECUTIVE SUMMARY

PROJECT OVERVIEW

Boven Solar PV4 (Pty) Ltd (a wholly owned Subsidiary of Mulilo Renewable Project Developments (PTY) LTD (“Mulilo”)) proposes to construct and operate a 75 MW Solar Photovoltaic (PV) Facility and associated electrical infrastructure (132 kV transmission line), on the Remaining Extent of Boven Rugzeer Farm 169 in the Northern Cape of South Africa. The project, referred to as **BOVEN SOLAR PV4**, will be located approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province (see Figure S1 for the locality map of the Boven Solar PV4 project). The Boven Solar PV4 project will connect to the Eskom Nieuwehoop Substation (currently under construction) via the proposed planned Boven Solar PV1 substation located on the Remaining Extent of Remaining Extent of Boven Rugzeer Farm 169 via a 132 kV overhead transmission line. The project forms part of the proposed Phase 2 Nieuwehoop Solar Park proposed by Mulilo.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 38282 and Government Notice (GN) R982, R983, R984 and R985 on 8 December 2014, a full Scoping and EIA Process is required for the construction of the proposed Boven Solar PV4 Facility. Boven Solar PV4 (Pty) Ltd has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the EIA Process in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activities. Given that energy related projects have been elevated to national strategic importance in terms of the EA Process, the proposed Solar PV Facility requires authorisation from the National Department of Environmental Affairs (DEA) as the Competent Authority (CA), acting in consultation with other spheres of government.

Mulilo intends to develop seven Solar PV Facilities of 75 MW each and associated electrical infrastructure (132 kV transmission lines for each 75 MW facility) on Portions 3 and 8 of Gemsbok Bult Farm 120 and the Remaining Extent of Boven Rugzeer Farm 169 near Kenhardt in the Northern Cape. The seven projects are indicated in Table S1. Boven Solar PV4 is one of the seven Solar PV Facilities proposed by Mulilo and is indicated in bold in Table S1. This EIA Report only discusses the proposed Boven Solar PV4 project.

Table S1: Seven Preferred Solar PV Facilities proposed by Mulilo near Kenhardt in the Northern Cape

No	Solar PV Project	Project Site	DEA Reference Number
1.	Gemsbok Solar PV4	Remaining Extent of Boven Rugzeer Farm 169	14/12/16/3/3/2/841
2.	Gemsbok Solar PV4	Portion 3 of Gemsbok Bult Farm 120	14/12/16/3/3/2/842
3.	Gemsbok Solar PV5	Portion 8 of Gemsbok Bult Farm 120	14/12/16/3/3/2/843
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7.	Boven Solar PV4	Remaining Extent of Boven Rugzeer Farm 169	14/12/16/3/3/2/847

Since the proposed seven 75 MW Solar PV Facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) is being undertaken for the proposed projects. However, seven separate Applications for EA were submitted to DEA (see DEA reference numbers issued in Table S1). Furthermore, seven separate Scoping Reports have been prepared and seven separate EIA Reports have been prepared and are hereby submitted to DEA for decision-making.

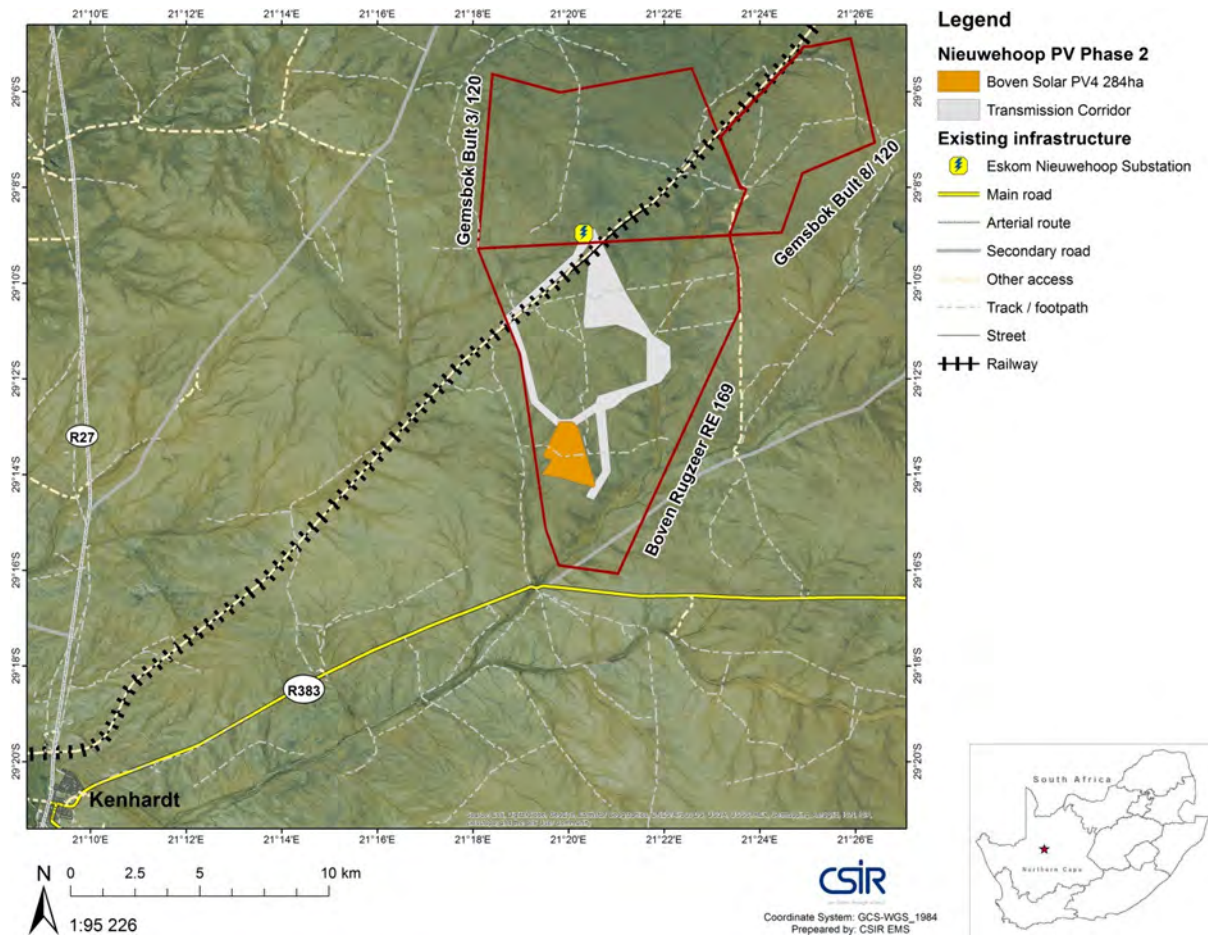


Figure S1: Proposed Locality of the proposed Boven Solar PV4 project, (including the power line routing) near Kenhardt in the Northern Cape

NEED FOR THE PROJECT

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as “IRP 2010”) was released by government in 2010, and proposes to develop and secure 17 800 MW of renewable energy capacity by 2030 (including wind, solar and other energy sources). The IRP was updated in 2013. The IRP 2010 has set up a target of 3 725 MW of renewable energy to be produced by Independent Power Producers (IPPs) by 2016. On 18 August 2015, an additional target of 6 300 MW to be procured and generated from renewable energy sources was added to the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) as noted Government Gazette 39111. The additional target allocated for solar PV energy is 2 200 MW.

In 2011, the Department of Energy (DoE) launched the 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, solar PV, biomass, biogas, landfill gas or small hydro projects. The two main evaluation criteria for compliant proposals are price and economic development, with other selection criteria including technical feasibility and grid connectivity, environmental acceptability, black economic empowerment, community development, and local economic and manufacturing propositions. The bidders with the highest rankings (according to the aforementioned criteria) are appointed as “Preferred Bidders” by the DOE. The proposed project aims to contribute to the above strategic imperative.

PROJECT DESCRIPTION

The proposed 75 MW Solar PV facility (i.e. Boven Solar PV4) will cover an approximate area of 220 hectares (ha). The preferred site includes approximately 284 ha of land. Due to the fact that this project only requires 220 ha of land, there is scope to avoid major environmental constraints through the final design of the facility.

The proposed project will make use of PV solar technology to generate electricity from the sun’s energy. The project is being developed with a possible maximum installed capacity of 150 MW DC each which produces 75 MW AC of electricity. Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The property on which the Solar Facility is to be constructed will be leased by Boven Solar PV4 (PTY) LTD from the property owners for the life span of the project.

It is proposed that Boven Solar PV4 (PTY) Ltd will implement the Self-Build Option for the additional electrical infrastructure to be constructed (which includes the 132 kV transmission line and additional feeder bay(s), busbar(s), 400/132kV transformer and a transformer bay at the Eskom Nieuwehoop Substation). Following the construction phase, the proposed transmission line will either be transferred into the ownership of Eskom or remain in the ownership of Boven Solar PV4 (PTY) LTD.

The Solar PV Facility will consist of the following components:

- **Solar Field**
 - Solar Arrays:
 - PV Modules;
 - Single Axis Tracking structures (aligned north-south) or Fixed Axis Tracking (aligned east-west);
 - Solar module mounting structures comprised of galvanised steel and aluminium;
 - Foundations which will likely be drilled and concreted into the ground; and
 - Solar measuring station.

- Building Infrastructure:
 - An Office;
 - Operational and maintenance control centre;
 - Warehouse/workshop;
 - Ablution facilities;
 - Inverter station;
 - On-site substation building;
 - On-site accommodation camp for construction workers; and a
 - Guard House.

- **Associated Infrastructure**
 - 132 kV overhead transmission line;
 - On-site substation;
 - Additional feeder bay(s), Busbar(s), and a 400/132 kV transformer bay at the Eskom Nieuwehoop Substation or extensions of the existing infrastructure;
 - Additional 400/132kV Transformer at the Eskom Nieuwehoop Substation;
 - Extension of the 132kV Busbar;
 - Extension of the 400kV Busbar;
 - 22/33 kV internal transmission line/underground cables;
 - Access road;
 - Internal gravel roads;
 - Fencing;
 - Panel maintenance and cleaning area;
 - Stormwater channels;
 - Water pipelines; and
 - Temporary work area during the construction phase (i.e. laydown area).

NEED FOR AN ENVIRONMENTAL IMPACT ASSESSMENT

As noted above, in terms of the EIA Regulations promulgated under Chapter 5 of the NEMA published in GN R982, R983, R984 and R985 on 4 December 2014 and enforced on 8 December 2014, a full Scoping and EIA Process is required for the proposed project. The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R984 (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 within an urban area”.*

Given that energy related projects have been elevated to national strategic importance in terms of the EA Process, the proposed project requires authorisation from the National DEA, acting in consultation with other spheres of government. The purpose of the EIA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The Environmental Assessment therefore needs to show the Competent Authority, the DEA; and the project proponent, Boven Solar PV4 (Pty) Ltd, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The Applications for EA for the Scoping and EIA Projects were submitted to the DEA via courier in October 2015, together with the Scoping Reports for comment. Appendix E of this EIA Report includes the proof of submission (i.e. courier waybills) of the Applications for EA and the Scoping Reports to the DEA. The DEA acknowledged receipt of the Scoping Reports and Applications for EA on 30 October 2015. DEA EIA Reference Numbers were assigned to each Scoping and EIA Project, as noted above.

The Scoping Reports were made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period which ended on 24 November 2015.

The comments received from stakeholders during the 30-day review of the Scoping Report were incorporated into the Scoping Report, and the finalised Scoping Report was submitted to the DEA in December 2015, in accordance with Regulation 21 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 22 of the 2014 NEMA EIA Regulations. The DEA accepted the finalised Scoping Report and Plan of Study for EIA on 29 January 2016, which enabled the commencement of the impact assessment phase.

The EIA Report is now being released to stakeholders for a 30-day review period. All comments received will be included in the finalised EIA Report, which will be submitted to DEA for decision-making. An electronic version of this report is also available on the following project website: <http://www.csir.co.za/eia/MuliloSolar>. Written notifications, hard copies and/or CDs containing the document were sent to key stakeholders, including authorities.

The results of the specialist studies and other relevant project information are integrated into the EIA Report. Part B of this EIA Report includes an Environmental Management Programme (EMPr). The EMPr is based on the recommendations made by specialists for design, construction, operation and decommissioning of the proposed project to minimise the potential impacts of the development of the proposed PV project.

SPECIALIST STUDIES

The following specialist studies were undertaken as part of the EIA Phase.

Table S2: The EIA Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
<i>Environmental Assessment Practitioners</i>		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Minnelise Levendal	CSIR	Project Leader
Surina Laurie	CSIR	Project Reviewer (Pr. Sci. Nat.)
<i>Specialists</i>		
Lukas Niemand	Pachnoda Consulting CC and associates	Ecological Impact Assessment (including fauna and avifauna). Pachnoda Consulting compiled the overall Ecological Impact Assessment with inputs from Kyllinga Consulting as indicated below).
Ina Venter	Kyllinga Consulting (sub-contracted by Pachnoda Consulting CC	Vegetation and Aquatic Impact Assessment

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Henry Holland	Private	Visual Impact Assessment
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
Dr. John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Johann Lanz	Private	Soils and Agricultural Potential Assessment
Rudolph du Toit	CSIR	Socio-Economic Impact Assessment
<i>Technical Studies to inform the EIA Process</i>		
P. S. van der Merwe and A. J. Otto	MESA Solutions	Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI)

It should be noted that the Socio-Economic Impact Assessment specialist study was subject to a peer review process by an external reviewer (Ms. Liza van der Merwe, a private consultant), as requested by the DEA in the Acceptance of the Scoping Report letter (Appendix G of this EIA Report).

Please note that RFI and EMI studies were undertaken and included in the EIA Report to determine potential impacts on the Square Kilometre Array (SKA) SA Project and to determine the level of mitigation shielding required in order to comply with the SKA Regulations. A summary of the studies is provided in Chapter 15 and a copy of the study is provided in Appendix J of the EIA Report.

Potential risks and impacts

This section provides a summary of the main impacts identified and assessed by the specialists in the EIA Report. The mitigation and management measures are included in the specialist studies and the EMPr of the EIA Report.

Visual Impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIGATION)
CONSTRUCTION PHASE		
Potential visual intrusion of construction activities associated with a PV plant on existing views of sensitive visual receptors.	Moderate	Low
Potential visual intrusion of construction activities associated with a 132 kV powerline on existing views of sensitive visual receptors.	Low	Low
OPERATIONAL PHASE		
Potential landscape impact of a large solar energy facility on a rural agricultural landscape.	Very Low	Very Low
Potential landscape impact of a 132 kV powerline on a rural agricultural landscape	Very Low	Very Low
Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors.	Moderate	Low
Potential visual intrusion of a 132 kV powerline on the views of sensitive visual receptors.	Very Low	Very Low
Potential impact of night lighting of a large solar energy facility on the nightscape of the region.	Very Low	Very Low
DECOMMISSIONING PHASE		
Potential visual intrusion of decommissioning activities	Moderate	Low

associated with a PV plant on views of sensitive visual receptors.		
Potential visual intrusion of decommissioning activities related to a 132 kV powerline on the existing views of sensitive visual receptors.	Low	Low

Overall the impacts are Negative, Low to Moderate before mitigation, and Low to Very Low after mitigation. No impacts of high significance (after mitigation) were identified.

Vegetation and Freshwater Impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIAGION)
CONSTRUCTION PHASE		
Loss of Species of Special Concern	High	Moderate
Loss of Primary Vegetation	Moderate	Low
Soil compaction and vehicle wheel track entrenchment	Low	Very Low
Erosion and sedimentation	Low	Very Low
Change in flow patterns due to erosion and sedimentation	Low	Very Low
Establishment of Invasive Alien species	Low	Low
Pollution and littering	Low	Very Low
OPERATIONAL PHASE		
Loss of Species of Special Concern	Moderate	Low
Loss of Primary Vegetation	Low	Low
Soil compaction and vehicle wheel track entrenchment	Low	Very Low
Erosion and sedimentation	Low	Very Low
Change in flow patterns due to erosion and sedimentation	Low	Very Low
Establishment of Invasive Alien species	Low	Low
Pollution and littering	Very Low	Very Low
DECOMMISSIONING PHASE		
Loss of Species of Special Concern	Low	Low
Loss of Primary Vegetation	Low	Low
Soil compaction and vehicle wheel track entrenchment	Low	Very Low
Erosion and sedimentation	Low	Very Low
Change in flow patterns due to erosion and sedimentation (positive)	Low	Very Low
Establishment of Invasive Alien species	Low	Low
Pollution and littering	Very Low	Very Low

Overall the impacts are Negative, Very Low to High before mitigation, and Moderate to Very Low after mitigation. The loss of species of conservation concern was identified as an impact of high significance (before mitigation). No impacts of high significance (after mitigation) were identified.

Avifaunal Impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIAGION)
CONSTRUCTION PHASE		
Habitat loss, fragmentation and displacement of threatened and near threatened species and species loss.	High	Moderate
Displacement and disturbances caused to birds due to noise generation and construction, operational and maintenance activities.	High	Moderate
Displacement of foraging taxa and loss of genetic cohesion between populations.	Moderate	Low
OPERATIONAL PHASE		
Increased bird mortalities due to collision with panels.	Moderate	Moderate
Disorientation of bird species due to exterior lighting and increased bird mortalities (due to collision with infrastructure).	Moderate	Low
Cleaning of panels could result in chemical pollution of water resources.	Low	Low
Secondary impacts related to the infrastructure attracting birds: nest –building activities and roosting birds.	Moderate	Low
Collision with power lines resulting in bird mortalities, especially threatened species.	Very High	High
Electrocution by power lines resulting in bird mortalities, especially threatened species.	High	Moderate
DECOMMISSIONING PHASE		
Increased competition and decline in species richness during rehabilitation.	Moderate	Low

Overall the impacts are negative, Low to Very High before mitigation, and Moderate to Low after mitigation. Habitat loss, fragmentation and displacement of threatened and near threatened species and species loss were identified as impacts of High significance (after mitigation). The collision with power lines resulting in bird mortalities, especially threatened species, was identified as an impact of High significance (after mitigation).

Faunal Impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIAGION)
CONSTRUCTION PHASE		
Habitat loss, fragmentation and displacement of Near- threatened species and species loss due to the clearing of habitat/vegetation.	Moderate	Low
Displacement and disturbances caused to animals due to noise generation.	Moderate	Low
Displacement of foraging taxa and loss of genetic cohesion between populations.	Moderate	Low
OPERATIONAL PHASE		

Disorientation of nocturnal animals and increased predation by insectivores caused by exterior lighting.	Moderate	Low
Cleaning of panels could result in chemical pollution of water resources.	Low	Low
Nest –building and roosting activities and interference with infrastructure - secondary impacts related to the infrastructure attracting animals.	Moderate	Low
Increased composition, loss of local diversity and potential increase in pest species due to habitat change and associated change to local community composition and abundance (under infrastructure).	Moderate	Low
DECOMMISSIONING PHASE		
Increased competition and decline in species richness - indirect impacts associated with changes in the local community structure.	Moderate	Low

Overall the impacts are negative, Low to Moderate (before mitigation) and Low (after mitigation). No impacts of high significance (after mitigation) were identified.

Soils and Agricultural Potential impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIAGION)
Degradation of veld vegetation beyond the direct footprint of the proposed PV facility due to constructional disturbance and potential trampling by vehicles.	Very Low	Very Low
Loss of topsoil due to poor topsoil management.	Very Low	Very Low
Loss of agricultural land use.	Very Low	Very Low
Soil erosion due to alteration of the land surface characteristics.	Very Low	Very Low
Additional land use income generation (positive impact).	Very Low	Not applicable

Overall the impacts are negative, Very Low (before mitigation) and Very Low (after mitigation). Additional land use income was identified as a positive impact of Very Low significance (before mitigation). No impacts of high significance (after mitigation) were identified.

Archaeology and Cultural Landscape:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIAGION)
CONSTRUCTION		
Damage to and destruction of archaeological resources.	Low	Very Low
Destruction of graves	Low	Very Low
Impacts to the natural and cultural landscape.	Low	Low
OPERATION AND DECOMMISSIONING		
Impacts to the natural and cultural landscape.	Low	Low

Overall the impacts are negative, Low to Moderate (before mitigation) and Low to Very Low (after mitigation). No impacts of high significance (after mitigation) were identified.

Palaeontology Impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIGATION)
Potential loss of palaeontological heritage resources through disturbance, damage or destruction of fossils and fossil sites (including associated geological contextual data) through surface clearance and excavation activities during the construction phase.	Very Low	Very Low

Overall the impact is negative, Very Low (before and after mitigation). No impacts of high significance (after mitigation) were identified.

Socio-Economic Impacts:

IMPACT	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIGATION)
CONSTRUCTION AND OPERATIONAL PHASES (NEGATIVE IMPACTS)		
Influx of jobseekers	Moderate	Low
Increases in social deviance	Moderate	Low
Expectations regarding jobs	Low	Very Low
CONSTRUCTION AND OPERATIONAL PHASES (POSITIVE IMPACTS)		
Local spending	Low	N/A
Local employment	Moderate	N/A
Human development resulting from the proposed Economic Development Plan	Moderate	N/A
DECOMMISSIONING PHASE (NEGATIVE IMPACT)		
Job losses at the end of the project life-cycle	Moderate	Low

Overall the negative impacts are Low to Moderate (before mitigation) and Low to Very Low (after mitigation). The positive impacts are Low to Moderate (before mitigation). No impacts (positive or negative) of high significance (after mitigation) were identified.

Traffic impacts:

IMPACT (NEGATIVE)	SIGNIFICANCE (BEFORE MITIGATION)	SIGNIFICANCE (AFTER MITIGATION)
CONSTRUCTION PHASE		
Increase in traffic.	Very Low	Very Low
Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.	High	Moderate
Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Moderate	Low
Change in quality of surface condition of the roads	Low	Low

Impacts on Square Kilometre Array (SKA):

Refer to the Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) Survey Technical Study in Chapter 15 (summary) and Appendix J of the EIA Report for the details of the study.

OVERALL EVALUATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

The project proponent (Boven Solar PV4 (Pty) Ltd) has indicated its commitment to environmental responsibility by adhering to the recommendations by the specialists for environmental buffers in planning the development footprints. The proposed project is considered to have an overall moderate to low negative environmental impact and an overall low positive socio-economic impact (with the implementation of respective mitigation and enhancement measures).

In order to ensure the effective implementation of the mitigation and management actions, an EMPr has been compiled and is included in Part B of this EIA Report. The mitigation measures necessary to ensure that the project is planned, constructed, operated and decommissioned in an environmentally responsible manner are listed in this EMPr. The EMPr is a dynamic document that should be updated regularly and provide clear and implementable measures for the establishment and operation of the proposed Solar PV facility.

The proposed Gemsbok Solar PV6 project falls within the Renewable Energy Development Zone 7 (REDZ 7) (Upington). The REDZs were identified during the wind and solar PV Strategic Environmental Assessment, conducted in support of the Presidential Infrastructure Coordinating Committee's Strategic Integrated Project (SIP) 8: "Green energy in support of the South African economy", to address the need of spatial strategic planning for the development of wind and solar PV projects in South Africa.

All the specialist studies recommend that the proposed project can proceed and be authorised by DEA. Based on the above considerations and given the strategic importance of renewable energy development in South Africa, it is the opinion of the EAP that the project benefits outweigh the costs and that the project will make a positive contribution to steering South Africa on a pathway towards sustainable infrastructure development.

Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed Boven Solar PV4 project receives EA in terms of the 2014 EIA Regulations promulgated under the NEMA.

An Electronic version of this report is available on the project website:

<http://www.csir.co.za/eia/MuliloSolar>

Interested and Affected Parties are invited to comment on the Environmental Impact Assessment Report. All comments are to be submitted to the EIA Project Manager, Minnelise Levendal, at the contact details below:

CSIR
Environmental Management Services

Contact Person:
Minnelise Levendal
PO Box 320
Stellenbosch
7599

Tel: 021 888 2490/2661
Fax: 021 888 2693
Email: mlevendal@csir.co.za



GLOSSARY



AC	Alternating Current
ADT	Average Daily Traffic
AGIS	Agricultural Geo-Referenced Information System
BGIS	Biodiversity Geographic Information System
BID	Background Information Document
CA	Competent Authority
CBA	Critical Biodiversity Area
CPV	Concentrated Photovoltaic
CSP	Concentrated Solar Power
CSIR	Council for Scientific and Industrial Research
DAFF	National Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DC	Direct Current
DM	Siyanda District Municipality
DMR	National Department of Minerals Resources
DoE	Department of Energy
DoT	National Department of Transport
DSR	Draft Scoping Report
DWA	National Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorization
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMI	Electromagnetic Interference
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Protection Areas
FSR	Final Scoping Report
GA	General Authorization
GG	Government Gazette
GIS	Geographical Information Systems
GN R	Government Notice Regulation
HPM	Hydraulic Plant Module
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
IDP	Integrated Development Plan
IPP	Independent Power Producer
IPPP	Independent Power Producer Programme
IRP	Integrated Resource Plan

kWh	Kilowatt Hours
LSA	Later Stone Age
Mf	Friesdale Charkonite
Mja	Jacomys Pan Formation
Mks	Klip Koppies Granite
MSA	Middle Stone Age
MW	Megawatts
NBA	South African National Parks
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystems Protected Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NPAES	National Protected Expansion Strategy
NWA	National Water Act (Act No. 36 of 1998)
PES	Present Ecological State
PGWC	Provincial Government of the Western Cape
PPA	Power Purchasing Agreement
PV	Photovoltaic
REDZs	Renewable Energy Development Zones
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RFI	Radio Frequency Interference
S&EIR	Scoping and Environmental Impact Reporting
SABAP2	South African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SANBI	South African National Biodiversity Institute
SARAS	South African Radio Astronomy Services
SARERD	South African Renewable Energy Resource Database
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SKA	Square Kilometre Array
TDS	Total Dissolved Solids
ToR	Terms of Reference
WASA	Wind Atlas of South Africa
WMA	Water Management Area
WULA	Water Use License Application



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 1:

Introduction

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1. INTRODUCTION

This chapter provides an introduction (project overview) of the proposed Solar Photovoltaic (PV) Facility, **BOVEN SOLAR PV4** on the Remaining Extent of Boven Rugzeer Farm 169 near Kenhardt in the Northern Cape. It provides an overview of the motivation or needs and desirability of the proposed PV Facility. It also provides information on the Applicant, the appointed Environmental Assessment Practitioner (EAP) and the specialist team. It provides the objectives of the Environmental Impact Assessment (EIA) Report and the Requirements for an EIA in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982).

1.1. Introduction to the Proposed Development of a Solar PV Facility

Boven Solar PV4 (Pty) Ltd (a wholly owned Subsidiary of Mulilo Renewable Project Developments (PTY) LTD (“Mulilo”)) proposes to construct and operate a 75 MW Solar Photovoltaic (PV) and associated electrical infrastructure (132 kV transmission line), on the Remaining Extent of Boven Rugzeer Farm 169 in the Northern Cape of South Africa. The project, referred to as **Boven Solar PV4**, will be located approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province (see Figure 1.1 for the locality map of the Boven Solar PV4 project). The connection point to the substation will be on the Remaining Extent of Portion 3 of Gemsbok Bult Farm 120. The proposed project forms part of the proposed Phase 2 Nieuwehoop Solar Park proposed by Mulilo.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 38282 and Government Notice (GN) R982, R983, R984 and R985 on 8 December 2014, a full Scoping and EIA Process are required for the construction of the proposed Boven Solar PV4 Facility. Boven Solar PV4 (Pty) Ltd has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the EIA Process in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activities. Given that energy related projects have been elevated to national strategic importance in terms of the EA Process, the proposed Solar PV Facility requires Authorisation from the National Department of Environmental Affairs (DEA) as the Competent Authority (CA), acting in consultation with other spheres of government.

Mulilo Renewable Project Developments (PTY) LTD intends to develop seven Solar PV Facilities of 75 MW each and associated electrical infrastructure (132 kV transmission lines for each 75 MW facility) on Portions 3 and 8 of Gemsbok Bult Farm 120 and the Remaining Extent of Boven Rugzeer Farm 169 near Kenhardt in the Northern Cape (see Figure 1.2). The seven projects are indicated in Table 1.1. Boven Solar PV4 is one of the seven Solar PV Facilities proposed by Mulilo and is indicated in bold in Table 1.1. This EIA Report only discusses the proposed Boven Solar PV4 project.

Table 1.1: Seven Preferred Solar PV Facilities proposed by Mulilo near Kenhardt in the Northern Cape

No	Solar PV Project	Project Site	DEA Reference Number:
1.	Gemsbok Solar PV3	Portion 3 of Gemsbok Bult Farm 120	14/12/16/3/3/2/841
2.	Gemsbok Solar PV4	Portion 3 of Gemsbok Bult Farm 120	14/12/16/3/3/2/842
3.	Gemsbok Solar PV5	Portion 8 of Gemsbok Bult Farm 120	14/12/16/3/3/2/843
4.	Gemsbok Solar PV6	Portion 8 of Gemsbok Bult Farm 120	14/12/16/3/3/2/844
5.	Boven Solar PV2	Remaining Extent of Boven Rugzeer Farm 169	14/12/16/3/3/2/845
6.	Boven Solar PV3	Remaining Extent of Boven Rugzeer Farm 169	14/12/16/3/3/2/846
7.	Boven Solar PV4	Remaining Extent of Boven Rugzeer Farm 169	14/12/16/3/3/2/847

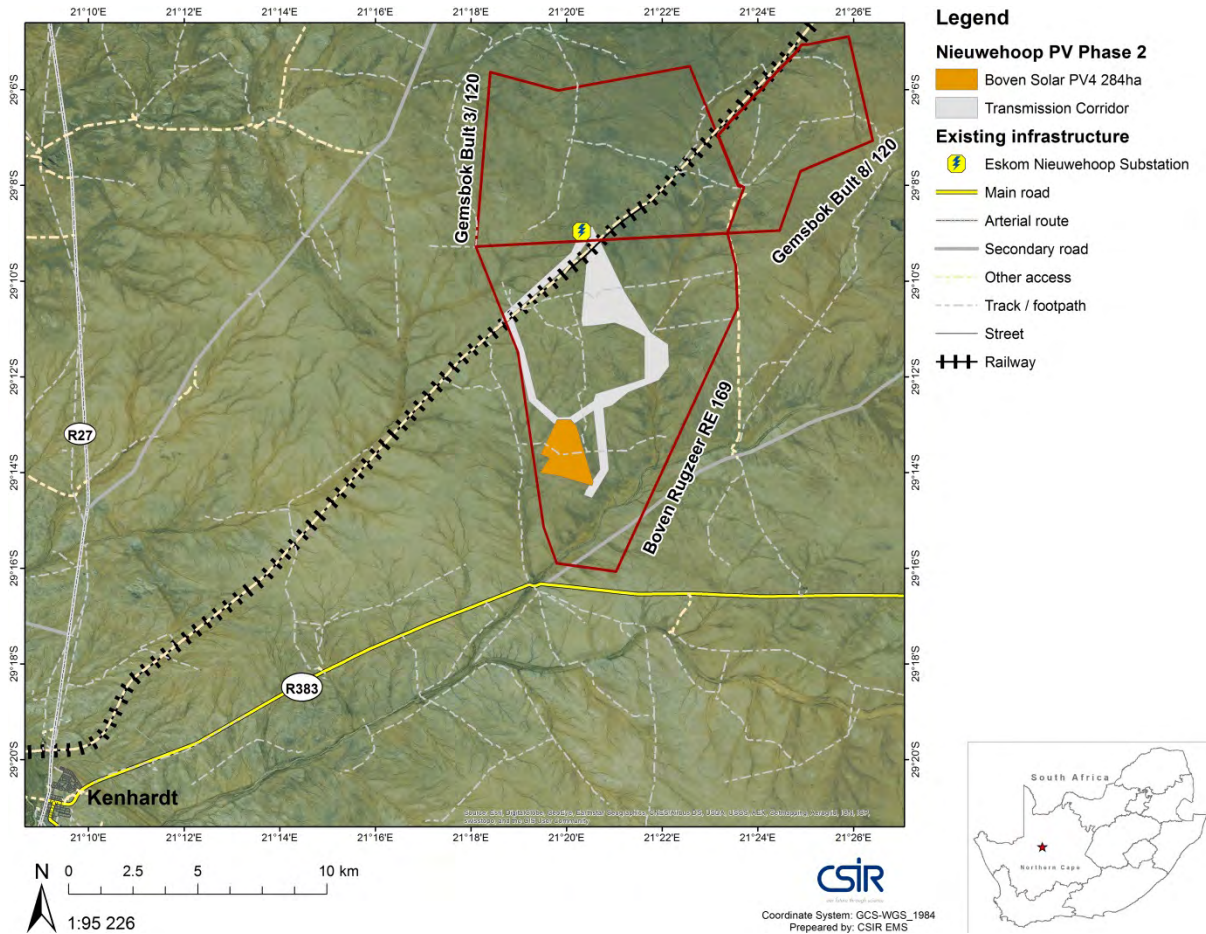


Figure 1.1: Locality map for the proposed Boven Solar PV4 Project near Kenhardt in the Northern Cape

Since the proposed seven 75 MW Solar PV Facilities are located within the same geographical area and constitute the same type of activity, an integrated Public Participation Process (PPP) is being undertaken for the proposed projects. However, seven separate Applications for EA were prepared and submitted to DEA. Furthermore, seven separate Scoping Reports were prepared and submitted to DEA for decision-making. DEA acknowledged receipt and accepted the Scoping Report in a letter dated 29 January 2016. Seven separate EIA Reports were prepared and are hereby submitted to DEA for decision-making.

The abovementioned integrated PPP approach, as well as the general approach to the Scoping and EIA Projects, were discussed with and approved by the DEA at a pre-application meeting, which was held on 17 September 2015. Appendix H of this EIA Report includes a copy of the agenda and notes of the meeting, as well as the presentation given by the CSIR at the pre-application meeting.

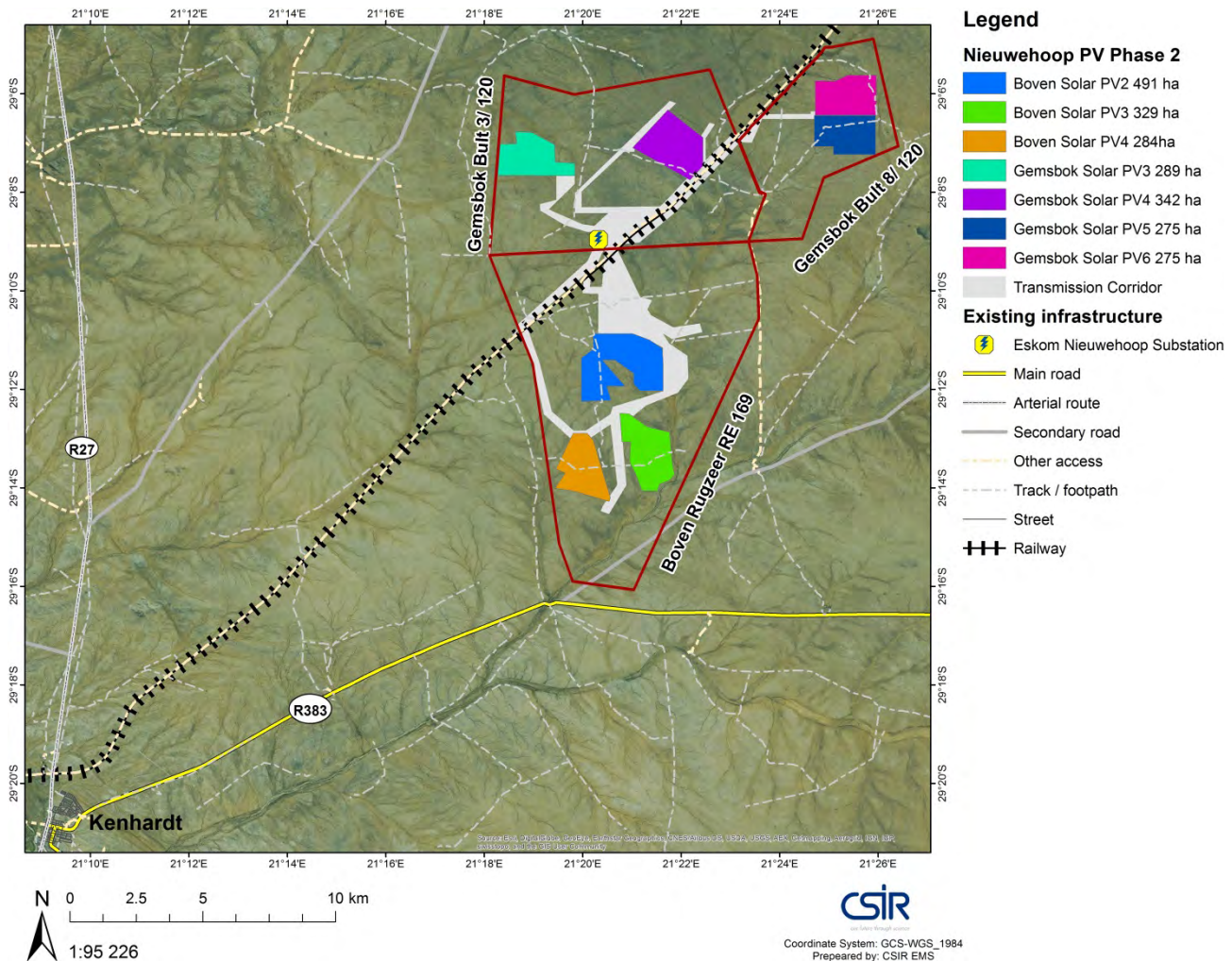


Figure 1.2: Locality map for the proposed preferred seven Solar Photovoltaic Facilities near Kenhardt in the Northern Cape

The proposed Solar PV Facility and associated infrastructure require a development area of approximately 220 ha. The project will comprise the following main components (which are discussed in more detail in the Project Description Chapter (Chapter 2) of this EIA Report:

▪ **Solar Field**

- Solar Arrays:
 - PV Modules;
 - Single Axis Tracking structures (aligned north-south) or Fixed Axis Tracking (aligned east-west);
 - Solar module mounting structures comprised of galvanised steel and aluminium;
 - Foundations which will likely be drilled and concreted into the ground; and
 - Solar measuring station.

- Building Infrastructure:
 - An Office;
 - Operational and maintenance control centre;

- Warehouse/workshop;
- Ablution facilities;
- Inverter station;
- On-site substation building;
- On-site accommodation camp for construction workers; and a
- Guard House.

▪ **Associated Infrastructure**

- 132 kV overhead transmission line;
- On-site substation;
- Additional feeder bay(s), Busbar(s), and a 400/132 kV transformer bay at the Eskom Nieuwehoop Substation or extensions of the existing infrastructure;
- Additional 400/132kV Transformer at the Eskom Nieuwehoop Substation;
- Extension of the 132kV Busbar;
- Extension of the 400kV Busbar;
- 22/33 kV internal transmission line/underground cables;
- Access road;
- Internal gravel roads;
- Fencing;
- Panel maintenance and cleaning area;
- Stormwater channels;
- Water pipelines; and
- Temporary work area during the construction phase (i.e. laydown area).

The 75 MW PV Facility will connect to the Eskom Nieuwehoop Substation (currently under construction) via the planned Boven Solar PV1 substation located on the Remaining Extent of Gemsbok Bult Farm 120 via a 132 kV overhead transmission line. Environmental Authorisation for the construction of the 400/50 kV Eskom Nieuwehoop Substation was granted on 21 February 2011 by the DEA (DEA reference number: 12/12/20/1166). An EA dated 14 February 2014 (DEA reference number: 12/12/20/2606; NEAS Reference Number: DEA/EIA/0000785/2011), granted authorisation to Eskom Holdings SOC Limited to construct, *inter alia*, the following within the existing development footprint of the Nieuwehoop Substation:

- 2 x 400 kV transformer feeder bay;
- A 400 / 132 kV transformer;
- 132 kV busbar;
- 400 / 132 kV 500 MVA x 3 transformers; and
- 8 x 132 kV feeder bays and associated lines.

Depending on the location of the substation on-site, the length of the proposed overhead line, connecting the on-site substation to the Nieuwehoop Substation, is approximately 9 km.

A detailed project description (based on the conceptual design) is provided in Chapter 2 of this EIA Report.

1.2. Requirements for an EIA

As noted above, in terms of the EIA Regulations promulgated under Chapter 5 of the NEMA published in GN R982, R983, R984 and R985 on 4 December 2014 and enforced on 8 December 2014, a full Scoping

and EIA Process is required for the proposed project. The need for the full Scoping and EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R984 (Listing Notice 2):

- *“The development of facility 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 within an urban area”.*

Chapter 4 of this EIA Report contains the detailed list of activities contained in R983 and R984 which may be triggered by the various project components and thus form part of the EIA Process.

The purpose of the EIA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The environmental assessment therefore needs to show the CA, the DEA; and the project applicant, Boven Solar PV4 (PTY) LTD, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

1.3. Project Applicant and Project Overview

Boven Solar PV4 (Pty) Ltd is a wholly owned Subsidiary of Mulilo Renewable Project Developments (PTY) LTD who is a locally owned, South African based renewable energy developer that was formed in 2008. The company focuses on solar, wind and hydro technologies and works with landowners, project developers, technology providers, regulators and investors to source and develop renewable energy projects. Mulilo acts as the project interface, coordinating the research and studies, the site identification, the project structure, environmental impact assessments, selecting the strategic partners, arranging financing, ensuring bid compliance and bidding under the Department of Energy’s (DoE) Renewable Energy Independent Power Producer Programme (REIPPP) and reaching financial closure. Mulilo’s core activities are shown in Figure 1.3 below.

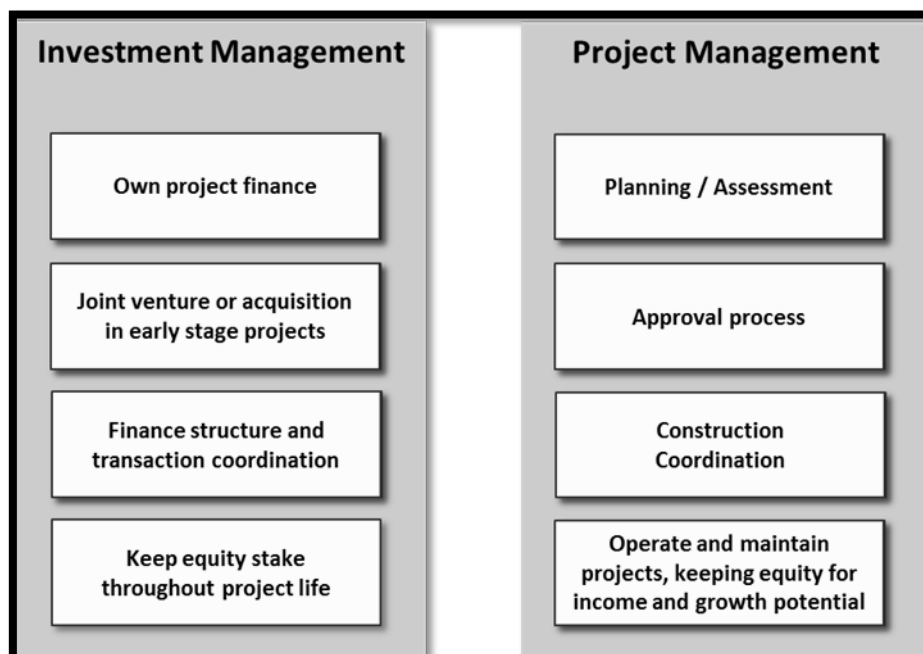


Figure 1.3: Mulilo’s core business activities

In December 2011, Mulilo was successful in Round 1 of the DoE REIPPP, as they were identified as a preferred bidder for two Solar PV Power Facilities of 10 MW and 20 MW located in Copperton and De

Aar. In October 2013, during Round 3 of the REIPPP Mulilo was also identified as a preferred bidder for two wind farms with a combined capacity of 244 MW located in De Aar, and two 75 MW Solar PV Power Facilities located in Prieska. Furthermore, in February 2014, Mulilo was awarded the Selected Bidder for two 5 MW Solar PV Facilities under the DoE's Small Independent Power Producer Programme and subsequently achieved Preferred Bidder status for its Du Plessis Solar PV4 project in De Aar on the 3rd October 2015. Mulilo plans to continue its success in the REIPPP and is planning to tender this project in this program. The proposed project is located in close proximity to the Eskom Nieuwehoop Substation, which is currently being constructed on the Remaining Extent of Portion 3 of Gemsbok Bult Farm 120.

The proposed Boven Solar PV4 project falls within the Renewable Energy Development Zone 7 (REDZ 7) (Upington). The REDZs were identified during the wind and solar PV SEA, conducted in support of the Presidential Infrastructure Coordinating Committee's Strategic Integrated Project (SIP) 8: "Green energy in support of the South African economy", to address the need of spatial strategic planning for the development of wind and solar PV projects in South Africa. On 17 February 2016, **Cabinet approved the gazetting of Renewable Energy Development Zones (REDZs)** and Power Corridors, as well as associated protocols for facilitating responsible planning and integrated decision-making for the development of wind and solar photovoltaic energy projects and strategic transmission line infrastructure across the country. In its statement, Cabinet said that the REDZs would "streamline the regulatory process, identify geographical areas where wind and solar photovoltaic technologies can be incentivized and where 'deep' grid expansion can be directed." It further states that these REDZs will ensure a transition to a low carbon economy, accelerate infrastructure development, and contribute to a more coherent and predictable regulatory framework that reduces bureaucracy related to the cost of compliance.

The proposed project will make use of PV solar technology to generate electricity from the sun's energy. The Applicant is proposing to develop a facility with a possible maximum installed capacity of 150 MW Direct Current (DC) which produces 75 MW Alternating Current (AC) of electricity from the Solar PV Facility. Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. It is proposed that Boven Solar PV4 (Pty) Ltd will implement the Self-Build Option for the additional electrical infrastructure to be constructed (which includes the 132 kV transmission line and additional feeder bay(s), busbar(s), 400/132kV transformer and a transformer bay at the Eskom Nieuwehoop Substation). Following the construction phase, the proposed transmission line will either be transferred into the ownership of Eskom or remain in the ownership of Boven Solar PV4 (Pty) Ltd.

1.4. Project Motivation (Including Need and Desirability)

At a national level, South Africa is facing serious electricity shortages as well as water scarcity. The proposed project aims to supply additional electricity to the national grid, with negligible demand for water. Importantly, the project will reduce the risk of rolling electricity blackouts, which are anticipated in South Africa's Medium Term Risk Mitigation Plan (MTRM) for electricity from 2011 to 2016. The evolution of South Africa's electricity sector is aligned with the global transition towards renewable sources of electricity generation. The urgency behind this evolution can be appreciated considering that South Africa is the largest emitter of greenhouse gases in Africa, accounting for as much as 42% of the continent's total emissions, and is also estimated to rank amongst the top 20 largest emitters of greenhouse gases in the world. These emissions are largely a result of an energy-intensive economy and high dependence on coal-based electricity generation. Furthermore, water demand is high for conventional coal-based electricity generation. Consequently, the South African Government is committed to increased use of renewable energy sources for electricity generation. Renewable energy is also a response aimed at advancing economic and social development through the creation of both sector-specific jobs, and jobs in economic sectors that can be sustained by the additional feed-in of electricity to the grid from renewable sources of electricity generation.

In addition to reducing the emission of greenhouse gases, the use of PV technologies avoids the high levels of water consumption associated with coal-based electricity generation. This is a benefit that must be considered in the context of Eskom's current consumption of approximately 2% of South Africa's total fresh water resources. Accelerated climate change has the potential to impact on the availability and quantity of water in South Africa, with decreases in summer rainfall predicted in the interior and increasing instances of droughts and floods predicted for the country in general. This creates a risk for the longevity in electricity generation that is water-dependent. By comparison, the proposed Solar PV Energy Project has no direct water demand during operations, except for periodic washing of solar panels (i.e. approximately twice per year). This reduces the demand on South Africa's water resources, while avoiding the risk of uncertainty in water supply, attributable to climate change effects.

On a provincial level, the Northern Cape Province is currently facing considerable constraints in the availability and stability of electricity supply. This is a consequence of South Africa's electricity generation and supply system being overstretched, and the reliance of the Northern Cape, as many other South African provinces, on the import of power to service its energy needs. The development of solar energy is important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability.

The Integrated Resource Plan (IRP) for South Africa for the period 2010 to 2030 (hereinafter referred to as "IRP 2010") was released by Government in 2010 (with an Updated Report, dated 2013) and proposes to develop and secure 17 800 MW of renewable energy capacity by 2030 (including wind, solar and other energy sources). The DoE is currently entered into the REIPPPP for the procurement of 3 725 MW of renewable energy from Independent Power Producers (IPPs) by 2016 and beyond to enable the Department to meet this target. Subsequent to this, an additional target of 6 300 MW from renewable energy sources was added to the REIPPPP as published in Government Gazette No. 39111 of 18 August 2015. The additional target allocated for wind energy is 3 040 MW and 2 200 MW for solar photovoltaic.

The two main evaluation criteria for compliant bidding proposals are price and economic development, with other selection criteria including technical feasibility and grid connectivity, environmental acceptability, black economic empowerment, community development, and local economic and manufacturing propositions. The bidders with the highest rankings (according to the aforementioned criteria) are appointed as "Preferred Bidders" by the DoE.

The first procurement phase of the DoE's REIPPPP includes five bidding windows. Boven Solar PV4 (Pty) Ltd intends to bid this project in the 2017 bidding process (i.e. Round 6) to be potentially selected as an IPP. Additional information regarding the project contextualisation is provided in Chapter 2 of this EIA Report.

1.4.1. Need and Desirability

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. Draft guidelines on Need and Desirability were published in the Government Gazette of 5 October 2012, for comment. These draft 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. In addition, the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) also published a Guideline on Need and Desirability in 2010. The DEA&DP Guideline (2010) states that the essential aim of investigating the need and desirability of a proposed project revolves around determining suitability (i.e. is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e. is it the right time to develop a given activity?). DEA&DP describes need and desirability as components of the "wise use of land", where need refers to time, and desirability to place. In other words, 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&DP 2010 Guideline to determine the need and desirability of the proposed project.

Table 1.2: DEA&DP's list of 14 questions to determine the "Need and Desirability" of a proposed project

NEED
<p>1. <i>Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the project and programmes identified as priorities within the credible IDP).</i></p> <p>Answer: Yes</p> <p>Justification: The !Kheis Municipality Draft Integrated Development Plan (IDP) (2012 – 2017 and 2015 – 2019) states that an opportunity exists to utilise solar energy more widely and lessen the dependence on wood and fire. This opportunity has been identified because not all people within the municipal area have access to electricity. Even though this solar facility will not provide the municipality directly with electricity, the energy produced by the facility will feed into the national grid. Furthermore, the DEA have commissioned a SEA to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The SEA aims to identify strategic geographical areas best suited for the roll-out of large scale wind and solar PV energy projects, referred to as REDZs. The proposed solar facility falls within one of the potential eight REDZs; i.e. within REDZ 7 (Upington). Therefore, should the REDZ be established and renewable projects operate within these areas, Eskom may be able to unlock funding to proactively construct grid infrastructure to facilitate generation capacity from these areas. This will mean that the municipality will also benefit from these upgrades and potentially alleviate the electrification backlogs present in the area.</p> <p>One of the priority issues identified within the !Kheis Municipality IDP (2012 – 2017 and 2015 – 2019) is the low levels of skilled people, as well as high levels of poverty and unemployment. The IDP (2012 – 2017 and 2015 – 2019) states that the objective to resolve this issue is to create an environment whereby the local community is empowered through capacity building and skills development (particularly for the youth). The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the DEA). It is estimated that between 60 and 90 skilled and 100 and 120 unskilled employment opportunities will be created during the construction phase. During the operational phase, approximately five skilled and seven unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.</p> <p>Therefore, the proposed Solar Energy Facility would help to address the need for increased electricity supply while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.</p>
<p>2. <i>Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?</i></p> <p>Answer: Yes</p> <p>Justification: As stated above, there is a great need in the area for electricity and grid upgrades. In addition to this, the Northern Cape has a very high solar resource availability which provides the province with an opportunity for the construction and operation of Solar Renewable project in the area. The need for job opportunities and electricity necessitates that these types of project be undertaken in the area. The preferred project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed project proceed, approximately 220 ha of the land will be developed on and it is not expected that this will threaten the agricultural activities present on site. The project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed seven solar PV projects proceed,</p>

approximately 1 540 ha of the land will be collectively developed on and it is not expected that this will threaten the agricultural activities present on site. The farm owner noted that the total sheep farming enterprise takes place on four adjacent farms totalling about 38,000 hectares and the loss of agricultural land therefore represents only 0.58% of the total available farm area. As noted in Chapter 11 of this EIA Report (Soils and Agricultural Potential Assessment), due to the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing.

3. *Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate).*

Answer: Yes

Justification: South Africa has a high level of Renewable Energy potential and presently has in place a generation target of 10 000 GWh of Renewable Energy. As noted above, at a national level, the DoE has set the target of having 17 800 MW of electricity generated from Renewable Energy sources contributing to the national grid by 2030 to ensure the continued uninterrupted supply of electricity. The DoE is currently entered into a bidding process, i.e. the REIPPPP for the procurement of 3 725 MW of renewable energy from Independent Power Producers (IPP) by 2016 and beyond to enable the Department to meet this target. Subsequent to this, an additional target of 6 300 MW from renewable energy sources was added to the REIPPPP as published in Government Gazette No. 39111 of 18 August 2015. The additional target allocated for solar photovoltaic energy is 2 200 MW. As noted above, Boven Solar PV4 (Pty) Ltd intends to submit the Solar PV Facility for the REIPPPP and this project can therefore contribute to the IPP goals and feed into the national grid, which results in this project having national importance.

At a local level, the !Kheis Municipality Draft IDP (2012 – 2017 and 2015 – 2019) states that an opportunity exists to utilise solar energy more widely (especially in the remote areas of the municipality) and lessen the dependence on wood and fire. This opportunity has been identified because not all people within the municipal area have access to electricity. The IDP (2015 – 2019) also states that due to small communities present in sparsely populated areas, effective distribution of electricity becomes difficult in some areas. Even though the solar facility will not provide electricity to the municipality directly, the energy produced by the facility will feed into the national grid. In addition, on a local level, the project will contribute towards job creation which is needed within the area as well as provide an economic boost to the municipality through local spending.

4. *Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?*

Answer: Partially

Justification: Some services are currently available to cater for the proposed development, however services to support the proposed facility will need to be designed and constructed as well. As mentioned above, the Eskom Nieuwehoop Substation (which is currently being constructed and is in close proximity to the proposed project site) will be used for the proposed project. An EA for the construction of the 400/50 50 kV Eskom Nieuwehoop Substation was granted to Eskom Holdings SOC Limited on 21 February 2011 by the DEA (Reference Number: 12/12/20/1166). In addition, an EA dated 14 February 2014 (DEA Reference Number: 12/12/20/2606; NEAS Reference Number: DEA/EIA/0000785/2011), , was also granted to Eskom Holdings SOC Limited to construct, *inter alia*, the following within the existing development footprint of the Nieuwehoop Substation:

- 2 x 400 kV transformer feeder bay;
- A 400 / 132 kV transformer;
- 132 kV busbar;
- 400 / 132 kV 500 MVA x 3 transformers; and
- 8 x 132 kV feeder bays and associated lines.

Furthermore, an existing road, i.e. the private Transnet Service Road or an unnamed farm road will be used

to gain access to the project site. The Transnet Service Road can be accessed from the R27 and the unnamed farm road from the R383. An internal gravel road may also be constructed from either the Transnet Service Road or the unnamed farm road. If the Transnet Service Road cannot be used, the unnamed farm road will need to be widened to approximately 6 m.

It terms of additional services, stormwater channels may be constructed as part of the proposed project. However, existing municipal services for the handling of waste, provision of water and sewage handling are expected to be used for the proposed project. Confirmation of the availability of the services will be obtained from the municipality.

5. *Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?*

Answer: No

Justification: There is no anticipated negative impact on municipal infrastructure planning (no clash of priority, and/or placement) as additional infrastructure required to maintain the proposed facility would be provided and maintained by the Applicant. The activities are furthermore proposed on agricultural land with little or no existing and planned infrastructure. Water for the washing of the solar panels will be supplied by the Local Municipality. This will be confirmed with the Local Municipality. The opportunity cost of constructing the proposed solar energy facility might increase the viability of agricultural productivity due to financial advantage of having a solar facility on agricultural property (i.e. farmers will receive payments for lease of the property per quarter or year). The opportunity cost of not constructing the proposed facility would be the maintenance of the current status quo, which is marginal agriculture and grazing.

6. *Is this project part of a national programme to address an issue of national concern or importance?*

Answer: Yes

Justification: The National Integrated Resource Plan for Electricity (IRP2) (2011) suggests that 42% of national energy supply must come from renewable energy sources between 2010 and 2030.

DESIRABILITY

7. *Is the development the best practicable environmental option for this land/site?*

Answer: Yes.

Justification: Based on the findings of this EIA, the proposed project would not have a significant (“high”) negative impact on the receiving environment with the implementation of suitable mitigation measures. As noted in Chapter 11 of this EIA Report (Soils and Agricultural Potential Assessment), due to the climate and soil limitations, the site is not suitable for any agricultural land use other than low intensity grazing. Currently, the site is used for grazing, which could continue in the surrounding regions, together with the generation of additional income via the leasing of the land to the Applicant. The potential negative impact of loss of agricultural land was rated with a very low significance (without the implementation of mitigation measures) in the Soils and Agricultural Potential Assessment.

Authorisation is supported as the site falls within a proposed REDZ 7 (Upington), where such land use has been assessed as very suitable in terms of a number of factors, including agricultural impact. It is preferable to incur a loss of agricultural land in such a region, without cultivation potential, than to lose agricultural land that has a higher potential, to renewable energy development elsewhere in the country.

However, it is also important to point out that the proposed project will be designed according to relevant national specifications and standards which are regarded as best practice in the renewable energy sector.

Based on the above, the construction of the proposed Solar PV facilities and the associated infrastructure is the best practicable option for the land. In addition, the construction of these facilities would have a positive socio-economic impact on the area.

8. *Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities?*

Answer: No

Justification: The proposed activity does not compromise any of the objectives set within the !Kheis Municipality Draft IDP (2012 – 2017 and 2015 – 2019). The proposed project will also be supportive of the IDP's objective of creating more job opportunities. The proposed Solar Energy Facility will assist in local job creation during the construction and operation phases of the project (if an EA is granted by the DEA). However, as noted above, employment opportunities will be temporary during the construction phase and long-term during the operational phase as the facility is expected to be operational for 20 years.

9. *Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Frameworks (EMFs), and if so, can it be justified in terms of sustainability considerations?*

Answer: No

Justification: Section 2.1.4 of the Siyanda District Municipality (now known as ZF Mgcawu District Municipality) EMF states that "in the year 2000, the utilization of groundwater in the area was approximately in balance with a sustainable yield from this source. No significant potential for further development exists". Groundwater will not be extracted on site to supply water for the proposed Solar PV Facility (e.g. washing of the solar PV panels or for the workers on site during the construction and operational phases of the project).

The approval of the proposed project would not compromise the integrity of the existing environmental management priorities for the area. Furthermore, the proposed project will require mitigation of potential negative environmental impacts during the construction, operational and potential decommissioning phases. To this end, an Environmental Management Programme (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 (EMPr included in Section B of the EIA Report).

As noted above, the project site is currently being used for agricultural purposes, predominantly grazing. It should be noted that the existing livestock grazing is expected to continue outside the fenced solar facility and potentially inside once the internal project footprint has been rehabilitated.

10. *Do location factors favour this land use (associated with the activities applied for) at this place? (this relates to the contextualisation of the proposed land use on the site within its broader context)*

Answer: Yes

Justification: As discussed above and in Chapter 2 of this EIA Report, the solar resource of this area is high, which makes it a very favourable location for the proposed solar facility. Furthermore, the proposed project is situated within the Upington REDZ (DEA, 2015). In terms of land-use and sense of place, the facility will be located on marginal agricultural land. Although the proposed Solar Facility is deemed a commercial land-use and not for agricultural purposes, an estimated 220 ha of the property area of 284 ha will be developed on for the specific solar proposed project, thus allowing farming to continue. The landscape of the immediate

adjacent area is already impacted by the ore freight railway line and will become even more industrialised by the Eskom Nieuwehoop substation and high voltage transmission lines. Furthermore, due to the rural location of the proposed facility, the visual intrusion has been identified as low with mitigation in the Visual Specialist Study (Chapter 7 of this EIA Report). This already disturbed viewshed is better suited to commercial development than an undisturbed natural viewshed. The visual impact was assessed in the Visual Impact Assessment.

11. How will the activities or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?

Answer: The impact on sensitive natural areas would be limited (i.e. not of a high significance (after mitigation))

Justification: The impact of the proposed project on cultural/heritage areas (archaeology and palaeontology) was assessed in the EIA Phase (Chapter 7-14 of the EIA Report). Based on assessments that were done, the impacts on heritage and natural resources are not anticipated to be of high significance after mitigation.

As noted above, an EMPr was compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. 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 facility in a rural landscape. The visual impact was assessed as part of the Visual Impact Assessment as indicated above. An environmental sensitivity map was prepared based on the input obtained from the various specialist studies (Chapter 17). The sensitive features were identified to enable the applicant to avoid these areas when the project layout was prepared (Chapter 17).

12. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?

Answer: The impacts are not anticipated to be significant

Justification:

- **Health and Wellbeing:** The impacts on health and wellbeing are expected to be minimal as the project is taking place within a sparsely populated region. Dust may be generated during the construction phase, however it is expected to be of a short-term duration and insignificant. However, where applicable, mitigation measures relating to potential impacts on the health and wellbeing of people (such as construction staff, farm workers, construction staff at the Eskom Nieuwehoop Substation and the operational staff of the ore railway line) were included in the EMPr.
- **Noise:** During the construction phase, noise may be generated as a result of the operation of equipment, vehicles and machinery, the transportation of construction materials and staff to and from site, the establishment of site construction areas, as well as general construction activities. However, the noise levels and impacts will be short-term and are not expected to be significant during the construction phase. During the operational phase, the proposed solar facility would not generate any noise. Mitigation measures have been provided in the EMPr to reduce the negative noise impacts during the construction phase.
- **Odours:** These will be minimal during the construction phase and non-existent during the operational phase.
- **Visual Character and Sense of Place:** In terms of visual character and sense place, the visual landscape and the agricultural landscape has been altered by the ore freight railway line. The site is expected to become even more industrialised by the Eskom Nieuwehoop Substation and high voltage transmission lines. The potential visual impact was assessed in the Visual Impact Assessment.

Notwithstanding the above, the Socio-Economic Impact Assessment that was undertaken concluded that the socio-economic benefits likely to result from the proposed project (e.g. creation of jobs and regional economic development) would most likely outweigh the issues mentioned above.

13. *Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?*

Answer: No

Justification: A Solar Energy Facility can be dismantled and completely removed from the site leased for the development and does not permanently prevent alternative land-uses on the same land parcel. Based on material and socio-economic terms, and measured to the value of the best alternative that is not chosen, the proposed project will result in positive opportunity costs.

Refer to Chapter 11 of this EIA Report (Soils and Agricultural Potential Assessment), which notes the impact of the proposed project on the potential negative loss of agricultural land and the potential positive impact of additional land use income, which were both rated with a very low significance (with the implementation of mitigation measures).

14. *Will the proposed land use result in unacceptable cumulative impacts?*

Answer: The cumulative impacts of some impacts are identified as significant, but these are not considered to be unacceptable.

Justification: The potential cumulative impacts resulting from the proposed project are discussed in the respective specialist studies (included in Chapters 7 to 14 of this EIA Report). Cumulatively, all of the Mulilo solar PV projects together with the Scatec solar PV projects will have a significant effect on loss of primary vegetation and bird collisions due to the proposed powerlines that will be constricted.

However mitigation measures will be put in place to reduce the impact. These measures are included in the EMPr (Part B of the EIA Report):

- Light on land building principal – i.e. only clearing vegetation where it is required and brush cutting where necessary. A comprehensive rehabilitation plan is included in Section 5 of the EMPr.
- Use of bird flight diverters as recommended by specialist. Using bird friendly pylons. The facility is also close to the substation, so the transmission lines will be shorter.

1.5. EIA Team

As previously noted, the CSIR has been appointed by Boven Solar PV4 (Pty) Ltd to undertake the EIA required for the proposed project. Public participation forms an integral part of the Environmental Assessment Process and assists in identifying issues to be considered during the EIA Process. The CSIR is undertaking the PPP for this EIA. Details on the PPP are included in Chapter 4 of this EIA Report.

The EIA team which is involved in this EIA Process is listed in Table 1.3 below. The team is highly qualified and experienced in conducting assessments for renewable energy projects in the past and most of the specialists have undertaken assessments in the study area before.

Table 1.3: The EIA Team

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
<i>Environmental Assessment Practitioners</i>		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Minnelise Levendal	CSIR	Project Leader
Surina Laurie	CSIR	Project Reviewer (<i>Pr. Sci. Nat.</i>)
<i>Specialists</i>		
Lukas Niemand	Pachnoda Consulting CC and associates	Ecological Impact Assessment (including fauna and avifauna). Pachoda Consulting compiled the overall Ecological Impact Assessment with inputs from Kyllinga Consulting as indicated below)
Ina Venter	Kyllinga Consulting (sub-contracted by Pachnoda Consulting CC)	Vegetation and Aquatic Impact Assessment
Henry Holland	Private	Visual Impact Assessment
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
Dr. John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Johann Lanz	Private	Soils and Agricultural Potential Assessment
Rudolph du Toit	CSIR	Socio-Economic Impact Assessment
<i>Technical Studies to inform the EIA Process</i>		
P. S. van der Merwe and A. J. Otto	MESA Solutions	Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI)

It should be noted that the Socio-Economic Impact Assessment specialist study was subject to a peer review process by an external reviewer (Ms. Liza van der Merwe, a private consultant), as requested by the DEA in the Acceptance of the Scoping Report letter (Appendix G of this EIA Report).

Please note that RFI and EMI studies were undertaken and included in the EIA Report to determine potential impacts on the Square Kilometre Array (SKA) SA Project and to determine the level of mitigation shielding required in order to comply with the SKA Regulations. A summary of the studies is provided in Chapter 15 and a copy of the study is provided in Appendix J of the EIA Report.

1.6. Details and Expertise of the Environmental Assessment Practitioners

Over the past 30 years the CSIR has been involved in a multitude of project across Africa and South Africa, with experience in 32 sub-Saharan African and Indian Ocean Island countries. The Environmental Management Services (EMS) group within the CSIR has been involved in the management and execution of numerous environmental assessment and management studies in more than 15 countries in Africa, as well as the Middle East, South America and Russia. These studies have included both public and private sector clients. Consequently, the CSIR EMS team offers a wealth of experience and appreciation of the environmental and social priorities and national policies and regulations in South Africa.

The EIA Project Team is being led by Minnelise Levendal, who will be supported by the Project Reviewer, Surina Laurie. Paul Lochner will act as Technical Advisor for the proposed project. Refer to Appendix A of

this EIA Report for the Curriculum Vitae of the EAPs. Appendix B includes a declaration of and affirmation by the EAP and specialists as required under the 2014 EIA Regulations.

Paul Lochner - Paul has 23 years of experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included SEAs, EIAs and Environmental Management Plans. In July 2003, he obtained certification as a registered EAP with the Interim Certification Board for EAPs of South Africa (EAPSA). He has been extensively involved in renewable energy projects over the last few years. He was the Project Leader for the Electrawinds Basic Assessment (BA) and EIA project at the Coega Industrial Development Zone (IDZ), and was the Project Leader for the EIA for the Mainstream Kouga wind energy project (Phase 1) at Jeffreys Bay. Phase 1 of this project was granted EA by the Eastern Cape Government in March 2009. He was part of the CSIR team that prepared the EIA and EMP for the Eskom wind energy demonstration facility at Klipheuwel (Western Cape), which was approved by the Western Cape provincial government. He is currently the Project Leader for the SEA for the location and placement of wind and solar energy projects in South Africa. He has also recently led EIAs for Solar PV projects in the Free State and Northern Cape for Mainstream Renewable Energy, Solaire Direct and Mulilo Renewable Project Developments. He has also authored several Guidelines for national and provincial government, such as the Guideline for EMPs published in 2005 by the Western Cape Government.

Minnelise Levendal – Minnelise is a Senior EAP in the EMS group of the CSIR and has a Master's degree in Biological Science (Botany). She has 16 years of experience in Environmental Management (which includes ten years working as an EAP). Before she joined the CSIR she was employed at the DEA&DP where she assessed EIAs, BAs and EMPs. Minnelise is currently managing various EIAs for wind and solar renewable energy projects in South Africa. Minnelise was the CSIR project manager for the 100 MW Ubuntu Wind Energy Facility near Jeffreys Bay (Environmental Authorisation granted in June 2012), as well as the 50 MW Banna Ba Pifhu Wind Energy Facility proposed by WKN Windcurrent near Humansdorp in the Eastern Cape (Environmental Authorisation granted in July 2014). She was the project manager of ten BAs for wind monitoring masts in South Africa as part of the National Wind Atlas Project of the Department of Energy. Environmental Authorisation from the DEA for all the ten masts was obtained in 2010.

Surina Laurie – Surina is a Senior EAP in the EMS group of the CSIR and she has a Master's degree in Environmental Management and is a Registered Professional Natural Scientist (Registration Number: 400033/15) with the South African Council for Natural Scientific Professions (SACNASP). She has more than five years of experience in environmental assessment and management. Surina has experience in the management and integration of various types of environmental assessments in South Africa for various sectors, including renewable energy, industry and tourism. She has also been part of advisory teams advising on financing, real estate, corporate, construction, environmental and regulatory aspects for various sponsors, developers and lenders during the DOE's first and second bidding windows in 2012 and 2013. Surina is currently working on several Solar PV EIAs in the Northern Cape and Free State. Surina was the Project Manager for the proposed (adjacent) Nieuwehoop Phase 1 Solar PV Development EIA, which obtained an Environmental Authorisation from DEA on 11 November 2015.

1.7. Objectives for this EIA Report

This EIA Report was preceded by a comprehensive Scoping Process. During the Scoping Phase, the Scoping Reports were made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 23 October to 24 November 2015. The comments received from stakeholders during the 30-day review of both the Scoping Report were incorporated into the Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA in December 2015, in accordance with Regulation 21 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of

Regulation 22 of the 2014 NEMA EIA Regulations. DEA received the Scoping Report on 8 December 2015 as acknowledged in their letter dated 29 January 2016. It is important to note that (for the purpose of completeness and continuity), the comments received from I&APs during the Scoping Phase have been included in Appendix G of this EIA Report. The DEA accepted the finalised Scoping Report and Plan of Study for EIA in a letter dated 29 January 2016 (in the same letter referred to above), which marked the end of the Scoping Phase (Appendix G of this EIA Report), after which the EIA Process moved into the impact assessment and reporting phase. For background on the Scoping Process, the reader is referred to the Scoping Report (CSIR, 2015).

This EIA Report is currently being released to stakeholders for a 30-day review period. All comments received will be included in the finalised EIA Report, which will be submitted to DEA for decision-making.

The primary objective of this EIA Report is to present stakeholders, I&APs and the Competent Authority, the DEA, with an overview of the predicted impacts and associated management actions required to avoid or mitigate the negative impacts; or to enhance the benefits of the proposed project.

In broad terms, the 2014 NEMA EIA Regulations (GN R982) stipulate that the EIA Process must be undertaken in line with the approved Plan of Study for the EIA, 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.

Based on the 2014 NEMA EIA Regulations, the objectives of the EIA Process 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 preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and 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 preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

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 noted in Regulation 23 (3) of the GN R982). 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 are addressed in this EIA Report is presented in Table 1.4.

As noted in Regulation 23 (4) of the GN R982, the EMPr that is required as part of the EIA Process is provided in Part B of this EIA Report and has been structured to comply with the requirements outlined in Appendix 4 of the 2014 NEMA EIA Regulations, as well as the requirements of DEA's acceptance of the

Scoping Report and Plan of Study for EIA (as shown in Appendix G of this EIA Report). An overview of this compliance is shown Part B of this EIA Report. In addition, the specialist studies that have been conducted as part of the EIA Phase need to comply with Appendix 6 of the 2014 NEMA EIA Regulations. Each specialist study (Chapters 7 to 14) provides an overview table showing compliance with these regulations.

Furthermore, this EIA Process is designed to satisfy the requirements of Regulations 41, 42, 43 and 44 of the 2014 NEMA EIA Regulations relating to the PPP and, specifically, the registration of I&APs and recording of submissions from I&APs. All I&APs on the current database for this EIA (Appendix C) have been informed of the release of the EIA Report for a 30-day comment period. All comments received will be recorded and addressed in the finalised EIA Report (as applicable) for submission to the authorities for decision-making.

Table 1.4: Requirements of an EIA Report as defined in terms of Appendix 3 of GN R982

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 2 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
Appendix 3 - (3)(a)	Details of - i. the EAP who prepared the report; and ii. the expertise of the EAP, including a curriculum vitae;	Chapter 1 and Appendix A
Appendix 3 - (3)(b)	The location of the activity, including - i. the 21 digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Chapter 2 and Chapter 3
Appendix 3 - (3)(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 2 and Chapter 3
Appendix 3 - (3)(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)(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
Appendix 3 - (3)(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;	Chapter 1, Chapter 2 and Chapter 5
Appendix 3 – (3) (g)	A motivation for the preferred development footprint within the approved site;	Chapter 5 and Chapter 17
Appendix 3 - (3)(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including - i. details of the development footprint alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be	Chapter 3, Chapter 4, Chapter 5, Chapter 6, Chapters 7-15; Chapter 17; the EMPr in Part B, and Appendix G

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 2 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
	<p>affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</p> <p>viii. the possible mitigation measures that could be applied and level of residual risk;</p> <p>ix. if no alternative development locations for the activity were investigated, the motivation for not considering such; and</p> <p>x. a concluding statement indicating the preferred alternative development location within the approved site;</p>	
Appendix 3 – (3)(i)	<p>A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including -</p> <p>i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</p> <p>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;</p>	Chapter 4, Chapter 5, Chapters 7 to 15, and Chapter 17
Appendix 3 – (3) (j)	<p>An assessment of each identified potentially significant impact and risk, including-</p> <p>i. cumulative impacts;</p> <p>ii. the nature, significance and consequences of the impact and risk;</p> <p>iii. the extent and duration of the impact and risk;</p> <p>iv. the probability of the impact and risk occurring;</p> <p>v. the degree to which the impact and risk can be reversed;</p> <p>vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>vii. the degree to which the impact and risk can be mitigated;</p>	Chapter 4, Chapters 7 to 15, and Chapter 17
Appendix 3 – (3) (k)	<p>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;</p>	Chapters 7 to 15, Chapter 17 and the Executive Summary
Appendix 3 – (3) (l)	<p>An environmental impact statement which contains-</p> <p>i. a summary of the key findings of the environmental impact assessment;</p> <p>ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and</p> <p>iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</p>	Chapters 7 to 15, Chapter 17; Executive Summary and Appendices I.1 and I.2
Appendix 3 – (3) (m)	<p>Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;</p>	Chapters 7 to 15, and Chapter 17
Appendix 3 – (3) (n)	<p>The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;</p>	Chapter 5, Chapters 7 to 14, and Chapter 17
Appendix 3 – (3) (o)	<p>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;</p>	Chapters 7 to 14, and Chapter 17
Appendix 3 – (3) (p)	<p>A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;</p>	Chapters 7 to 14, and Chapter 17
Appendix 3 – (3) (q)	<p>A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;</p>	Chapter 17

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 2 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
Appendix 3 – (3) (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)(s)	An undertaking under oath or affirmation by the EAP in relation to - i. the correctness of the information provided in the reports; ii. the inclusion of comments and inputs from stakeholders and interested and affected parties; i. the inclusion of inputs and recommendations from the specialist reports where relevant; and ii. 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)(t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Chapter 2
Appendix 3 – (3) (u)	An indication of any deviation from the approved scoping report, including the plan of study, including - 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)(v)	Any specific information that may be required by the competent authority; and	Executive Summary, Chapter 13, Appendix 13.1 (in Chapter 13), Chapter 15, Appendix I, and Appendix J
Appendix 3 - (3)(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable at this stage



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 2: Project Description

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2 PROJECT DESCRIPTION

This chapter provides an overview of the conceptual project design and an overview of the site and technology selection process (as provided by Boven Solar PV4 (PTY) LTD for the proposed 75 MW Solar PV Facility, referred to as Boven Solar PV4, near Kenhardt in the Northern Cape).

The purpose of this chapter is to present sufficient project information on the proposed Solar PV facility (including the facility itself and the associated infrastructure) to inform Interested and Affected Parties (I&APs) and the Competent Authority, DEA. The information in this chapter was presented to the specialists to inform their specialist studies which were undertaken during the EIA phase.

2.1 Site Selection

2.1.1 National Level Considerations

2.1.1.1 Solar Radiation

The north-western part of South Africa has the highest Global Horizontal Irradiation¹ (GHI), relevant to PV installations (Figure 2.1) and Direct Normal Irradiance² (DNI), relevant to CPV and tracking PV installations (Figure 2.2). Therefore, this section of South Africa is deemed the most suitable for the construction and operation of solar energy facility. The Northern Cape (the area with the predominant pink shading in Figure 2.1) has a solar radiation of 2 300 kWh/m² per annum. Various developers have received several approvals for PV facility on farms in the Northern Cape, which shows the suitability of this area for this type of development.

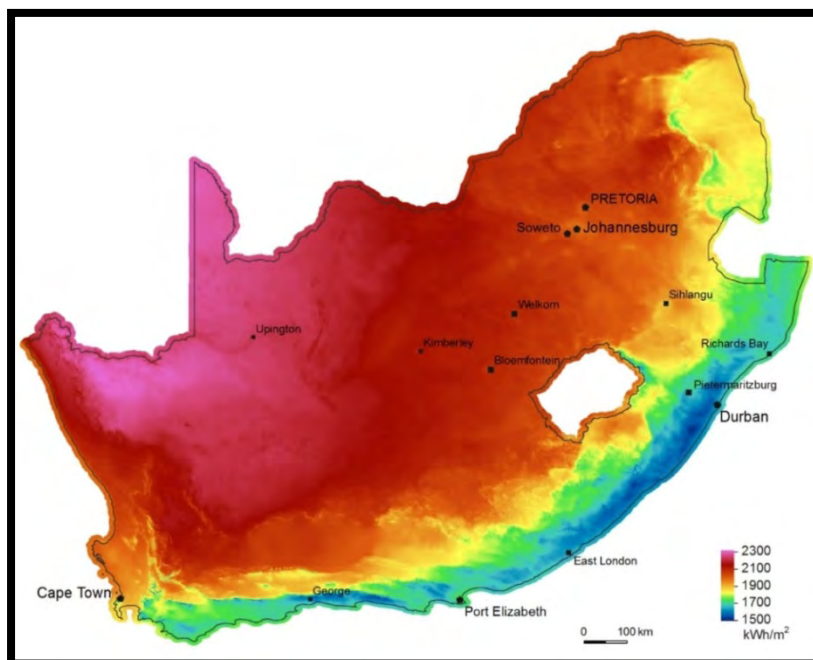


Figure 2.1: Solar Resource Availability in South Africa (Source: SolarGIS map© 2013 GeoModel Solar)

¹ Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground

² Direct Normal Irradiance is the amount of solar radiation received per unit area by a surface that is always held perpendicular (or normal) to the rays that come in a straight line from the direction of the sun at its current position in the sky.

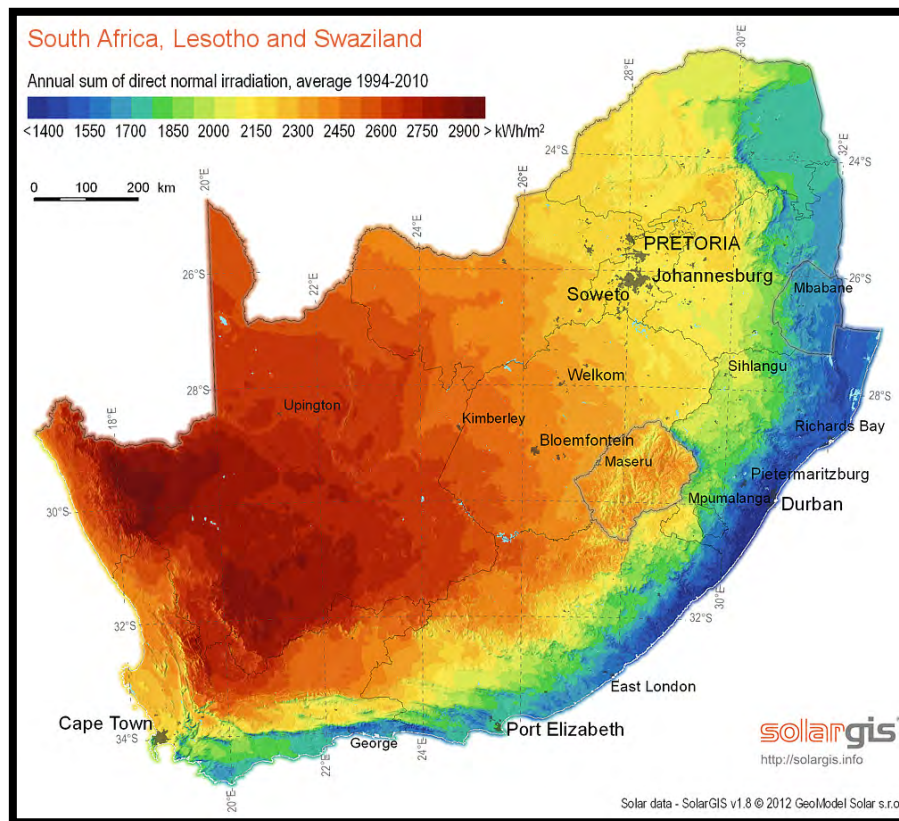


Figure 2.2: Direct Normal Irradiation of South Africa (Source: SolarGIS map © 2014 GeoModel Solar).

2.1.1.2 Renewable Energy Independent Power Producer Programme and Strategic Environmental Assessment for Wind and Solar PV in South Africa

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as “IRP2010”) proposes to secure 17 800 MW of renewable energy capacity by 2030. The Department of Energy (DoE) subsequently has entered into a bidding process for the procurement of 3 725 MW of renewable energy from Independent Power Producers (IPP) by 2016 and beyond to enable the Department to meet this target. In order to submit a bid, the proponent is required to have obtained an Environmental Authorisation in terms of the EIA Regulations as well as several additional authorisations or consents. It has been determined that even though the current processes will enable renewable energy to be fed into the national grid, the REIPPPP does have certain inefficiencies. To this end, the National DEA, in discussion with the DoE, has been mandated by MinMec to undertake a Strategic Environmental Assessment (SEA)³ to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Wind and Solar PV SEAs are in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. The SEAs aims 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 SEAs is 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 access⁴. Following the completion of the SEAs, the proposed REDZs, shown in Figure 2.3, were submitted to Cabinet for approval for the rollout of Wind and Solar PV Energy Facilities in the Northern Cape, Eastern Cape, Western Cape and Free State provinces. **On 17 February 2016, Cabinet approved the gazetting of Renewable Energy Development Zones (REDZs) and Power Corridors**, as well as associated protocols for facilitating responsible planning and integrated decision-making for the

³ Information on this process can be obtained at: <http://www.csir.co.za/nationalwindsolaresea/background.html>

⁴ More information on the SEA can be read at <https://redzs.csir.co.za/>

development of wind and solar photovoltaic energy projects and strategic transmission line infrastructure across the country.

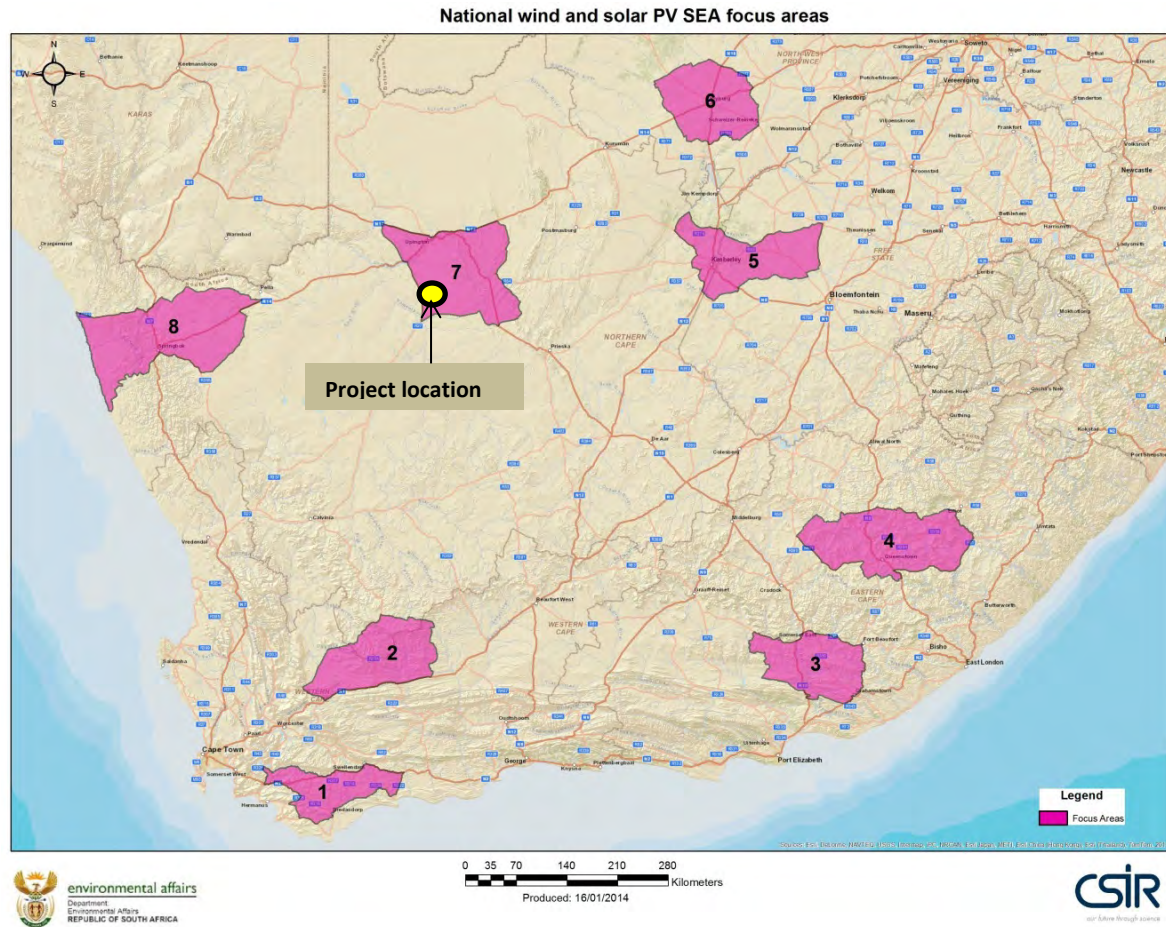


Figure 2.3: Renewable Energy Development Areas identified in the Strategic Environmental Assessment (the proposed Boven Solar PV4 (PTY) LTD Solar PV Facility falls within the proposed REDZ 7 (Upington))

The proposed Solar PV Facility currently falls within the proposed REDZ 7 (Upington). The proposed project is therefore in line with the criteria of the SEA and located in an area of strategic importance for Solar PV development. It should be noted that even if a project falls within a REDZ, and the REDZs as proposed are promulgated, the proposed development still requires site specific assessments as per the site protocol in order to determine the potential impacts of a project at a local and site specific level.

2.1.2 Site Specific Considerations

On a local (site specific) level, the site selection process took into account the following factors:

Table 2.1: Site selection factors and suitability of the site

FACTOR	SUITABILITY OF THE SITE
Land Availability	The Remaining Extent of Boven Rugzeer is of a suitable size for the proposed Solar PV Facility. The land available to develop at the preferred site comprises approximately 7 200 ha, (the project area of the facility comprises approximately 280 ha) however only approximately 220 ha will be required for the proposed project.
Irradiation Levels	2 100 – 2 300 kWh/m ² (i.e.very good)
Distance to the grid	<p>An Environmental Authorisation for the construction of the 400/50 50 kV Eskom Nieuwehoop Substation was granted to Eskom Holdings SOC Limited on 21 February 2011 by the DEA (Reference Number: 12/12/20/1166). Site preparation and construction of the substation has commenced and is currently underway. An Environmental Authorisation (DEA Reference Number: 12/12/20/2606; NEAS Reference Number: DEA/EIA/0000785/2011), dated 14 February 2014, was also granted to Eskom Holdings SOC Limited to construct, <i>inter alia</i>, the following within the existing development footprint of the Nieuwehoop Substation:</p> <ul style="list-style-type: none"> - 2 x 400 kV transformer feeder bay; - A 400 / 132 kV transformer; - 132 kV busbar; - 400 / 132 kV 500 MVA x 3 transformers; and - 8 x 132 kV feeder bays and associated lines. <p>The proposed project will be located approximately 9 km from the Eskom Nieuwehoop Substation (see Figure 2.4).</p>
Site Accessibility	The proposed project site can be accessed via the existing Transnet Service Road (private) or an unnamed farm road. The Transnet Service Road can be accessed from the R27 and the unnamed farm road can be accessed via the R383. An internal gravel road/s may be constructed from the Transnet Service Road or the unnamed farm road to the preferred site.
Topography	Slope ≤2% (Level to very gentle slope).
Fire Risk	Main vegetation type is Bushman arid grassland, low fire risk.
Current Land Use	Agriculture - Grazing

The overall locality of the proposed preferred Boven Solar PV4 (including the power line routing) is shown in Figure 2.4.

During the Scoping phase, two projects were put forward and assessed, i.e. the Boven Solar PV4 and the Boven Solar PV4 Alternative project. The EIA Report only includes and assesses the preferred Solar PV Facility, i.e. Boven Solar PV4. The selection of the preferred alternative is explained in Chapter 5 of the EIA Report.

As noted previously, the proposed project will take place on the Remaining Extent of Boven Rugzeer Farm 169 (Surveyor General 21-Digit Code: C0360000000016900000) near Kenhardt in the Northern Cape near Kenhardt in the Northern Cape. The co-ordinates of the approximate mid-point of Boven Solar PV4) are 29°13'35.569"S 21°20'1.246"E.

The co-ordinates of the boundary/corner points of the Boven Solar PV4 project site are shown in Table 2.2 below. The coordinates of the start, middle and end point of a linear activity must also be provided as requested in the letter of Acceptance of the Scoping Report from DEA dated 29 January 2016. These coordinates of the proposed powerline from the Boven PV4 project site to the Nieuwehoop substation are also shown in Table 2.2 below.

Table 2.2: Co-ordinates of the Corner Points of the Preferred Project Site

Site	Point	Latitude	Longitude
Boven Solar PV4	North	29° 12' 54.0468" S	21° 19' 57.6120" E
	West	29° 13' 37.2036" S	21° 19' 27.7536" E
	South- West	29° 14' 0.8448" S	21° 19' 26.4144" E
	South- East	29° 14' 16.6560" S	21° 20' 31.8084" E
Powerline corridor	Start point	29°12'55.02"S	21°19'57.76"E
	Middle point	29° 9'59.91"S	21°20'3.60"E
	End point	29° 9'2.05"S	21°20'19.97"E

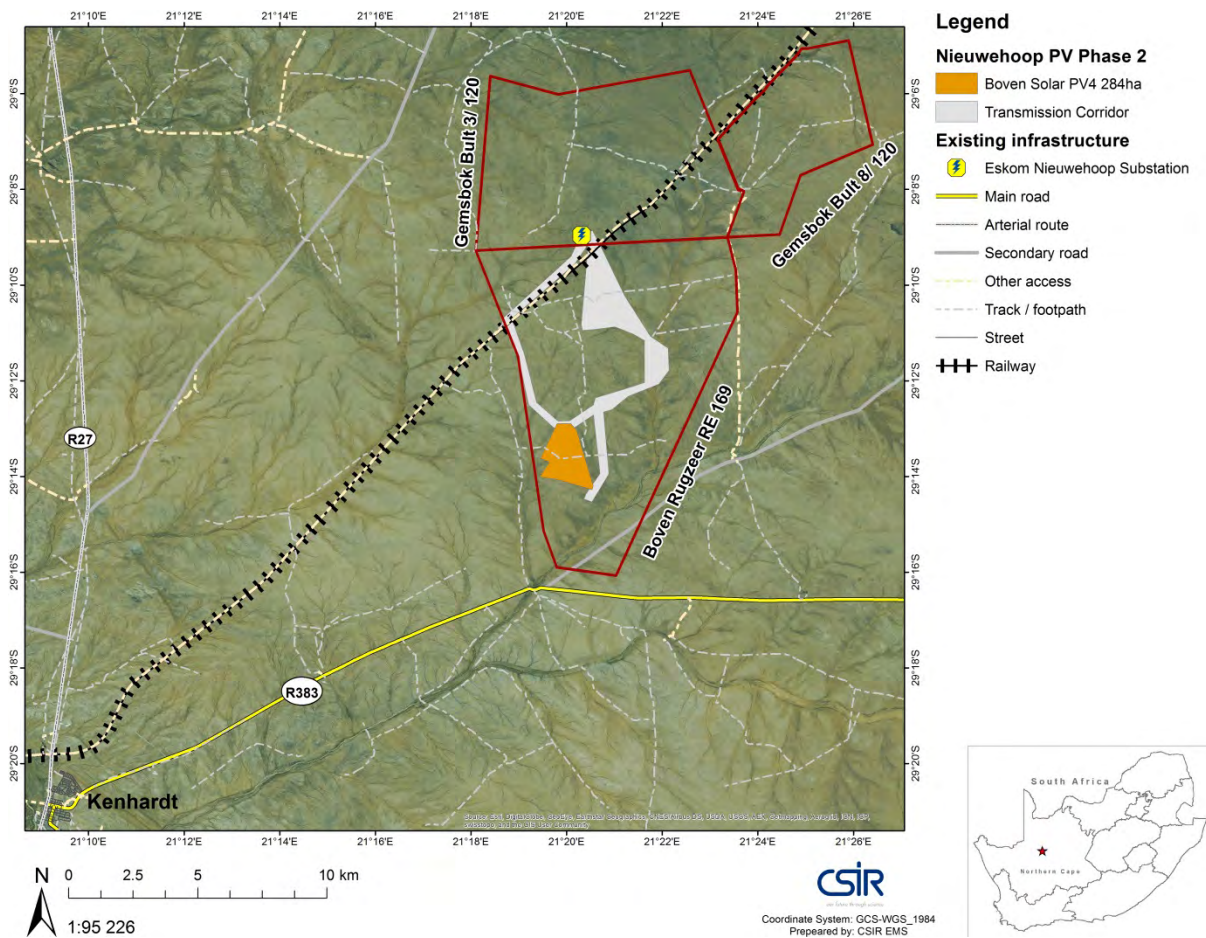


Figure 2.4: Locality of the proposed preferred Boven Solar PV4 project (including the power line routing)

2.2 Technology Selection

The different options for solar panel types and mounting systems that were investigated by the Applicant and deemed feasible for the solar facility were discussed in the Scoping Report (CSIR, 2015).

2.2.1 Solar Panel Type

Conventional solar PV panels will be used for the project. Conventional PV technology does not make use of any mirrors or lenses and generates electricity by converting solar radiation energy into a Direct Current (DC) which then needs to be converted to an Alternating Current (AC) to connect to the grid.

In terms of water usage, conventional PV technologies require less water than other technologies / (i.e. 19 litres of water per MW of electricity produced per hour). In comparison, a Concentrated Solar Power (CSP) system needs approximately 3 420 litres of water per MW of electricity produced per hour during the operational period.

Due to the scarcity of water in the proposed project area, and the large volume of water required for the CSP system, only conventional PV (has been considered for the proposed Solar PV Facility (Figure 2.5).



Figure 2.5: Conventional PV technology

2.2.2 Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. Two main mounting systems are considered as part of the EIA (see Figure 2.6):

- Horizontal Single Axis Tracking Systems (aligned north-south); and
- Fixed Axis Mounting Structures (aligned east-west).

In the Fixed Axis Mounting Structures, the PV panels are installed at a set tilt facing north and cannot move, whereas in a Single Axis Tracking System the panels follow the sun (i.e. east to west) to ensure maximum exposure to sunlight (Vermaak, 2014). The type of mounting system will be confirmed during the detailed engineering phase.

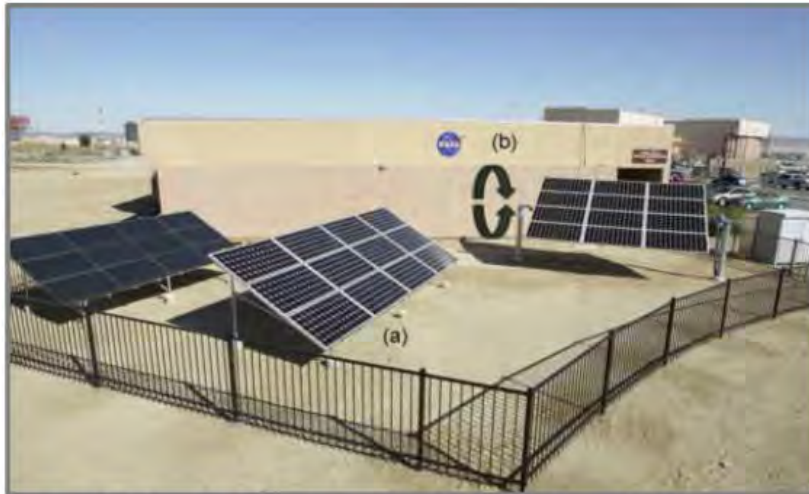


Figure 2.6: (a) Fixed axis tracking system and (b) single axis tracking system
(Source: Mulilo Renewable Project Developments)

2.3 Key Components of the Proposed Solar Energy Facility

A summary of the key components of the proposed project is described below. It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of an EA, should such an authorisation be granted for the proposed project) but that the information provided below is seen as the worst-case scenario for the project. The project is being developed with a possible maximum installed capacity of 150 MW DC each which produces 75 MW AC of electricity. As mentioned in Chapter 1 of this EIA Report, once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The property on which the Solar Facility is to be constructed will be leased by Boven Solar PV4 (PTY) LTD from the property owners for the life span of the project. The preferred location within the project site, as determined during the Scoping Phase, includes approximately 284 ha of land in total. Due to the fact that the solar PV facility requires approximately 220 ha of land, there is scope to avoid major environmental constraints through the final design of the Solar Facility.

To this end, the larger 284 ha buildable area was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Chapter 17 of this EIA Report). This map shows the sensitivities on site (terrestrial, aquatic, and sensitive heritage features) within the larger 284 ha buildable area that was assessed as part of this EIA. The site layout of the solar PV facility was subsequently overlain on this map (Chapter 17). Based on the map, the location for the Boven PV4 facility, avoids the sensitive features that were identified by the specialists within the original buildable area. The Development footprint is 220 ha in extent. The total surface area to be covered (including all associated infrastructure and roads etc) is 25 ha. It should be noted that even though a site layout has been provided, should the layout change following the issuing of the EA (should it be granted), that any alternative layout occurring within the boundaries of the Development Envelope would not change the scope of work or the findings of the impact assessments undertaken. The Development Envelope is considered to be a “box” in which the components discussed within the chapter can be constructed at whichever location without requiring an additional assessment or change in impact significance. Any changes to the layout are therefore considered to be non-substantive. This approach allows the final layout and micro-siting of the panels and associated infrastructure to take place at a later stage and

anywhere within the boundaries of the assessed Development Envelope, as determined by the EIA Process, provided that the recommended mitigation measures are adopted, where applicable. This is discussed further in Chapter 17 of this EIA Report. It should be noted that a similar approach has been followed for the electrical infrastructure and transmission lines. To this end, an electrical infrastructure corridor has been proposed for proposed transmission lines. The approach to determine a development envelope was included in the Final EIA Reports for the Nieuwehoop Phase 1 Solar PV Projects which received Environmental Authorisation on 11 November 2015.

If you consider the cumulative impact, the total area of the farms (not the facility footprints) where the overall proposed seven Solar Facilities will be constructed on comprises approximately 14 380 ha (this includes approximately 5 051 ha and 2 109 ha for Portion 3 and Portion 8 of Gemsbok Bult Farm respectively, and approximately 7 220 ha for the Remaining Extent of Boven Rugzeer Farm 169). The solar PV projects will occupy an area of approximately 220 ha each, i.e. 1 540 ha for the seven projects. This makes up approximately 11% of the overall total area of the farms. Approximately 50% of the 220 ha will be covered by solar PV panels, but less than 10% of the ground is actually taken up by foundations/piles, etc. The vegetation underneath the solar PV panels will not be cleared, but will remain intact. Therefore, less than 10% of the vegetation within the project area will be cleared. It should be noted that vegetation will not be cleared underneath the solar panels (Figure 2.7).



Figure 2.7: The vegetation underneath the solar panels will not be cleared, but will remain intact (Source: Mulilo Renewable Project Developments)

The two main components of the project will consist of the solar field (solar panels and building infrastructure) and the associated infrastructure. The technical components forming part of the Solar Facility are discussed in detail in Sections 2.3.1 and 2.3.2 below.

The Solar Facility will consist of the following components:

- **Solar Field**
 - Solar Arrays:
 - PV Modules;
 - Single Axis Tracking structures (aligned north-south) and Fixed Axis Mounting structures (aligned east-west);
 - Solar module mounting structures comprised of galvanised steel and aluminium;
 - Foundations which will likely be drilled and concreted into the ground; and a
 - Solar measuring station.
 - Building Infrastructure:
 - Offices;
 - Operational and maintenance control centre;
 - Warehouse/workshop;
 - Ablution facilities;
 - Converter station;
 - On-site substation building;
 - On-site workers accommodation camp; and a
 - Guard House.
- **Associated Infrastructure**
 - 132 kV overhead transmission line (Steel Monopole design);
 - On-site substation;
 - Additional feeder bay and Busbar at the Eskom Nieuwehoop Substation or extensions of the existing infrastructure;
 - A new 400/132kV transformer bay at the Eskom Nieuwehoop Substation;
 - 400/132kV Transformer at the Eskom Nieuwehoop Substation;
 - Extension of the 400kV busbar;
 - Extension of the 132kV Busbar;
 - 22/33 kV internal transmission lines/underground cables;
 - Solar resource measuring station;
 - Access road;
 - Internal gravel roads;
 - Fencing;
 - Panel maintenance and cleaning area;
 - Stormwater channels; and a
 - Temporary work area during the construction phase (i.e. laydown area).

The BOVEN SOLAR PV4 project will connect to the Eskom Nieuwehoop Substation (currently under construction) via the proposed Gemsbok Solar PV1 Substation located on the Remaining Extent of Portion 3 of Gemsbok Bult Farm 120 via a 132 kV overhead transmission line.

2.3.1 Solar Field

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

2.3.1.1 Solar Arrays

The footprint of the proposed PV Solar Facility is estimated to be approximately 220 ha and will include the development of the solar field including electrical infrastructure, the structure of the solar array and foundations. The exact number of solar panels arrays, confirmation of the foundation type and detailed design will follow as the development progresses. The site layout plan has been included in Chapter 17.

▪ **PV Modules**

The smallest unit of a PV installation is a cell. A number of cells form a module, and finally a number of modules form the arrays (Figure 2.8).

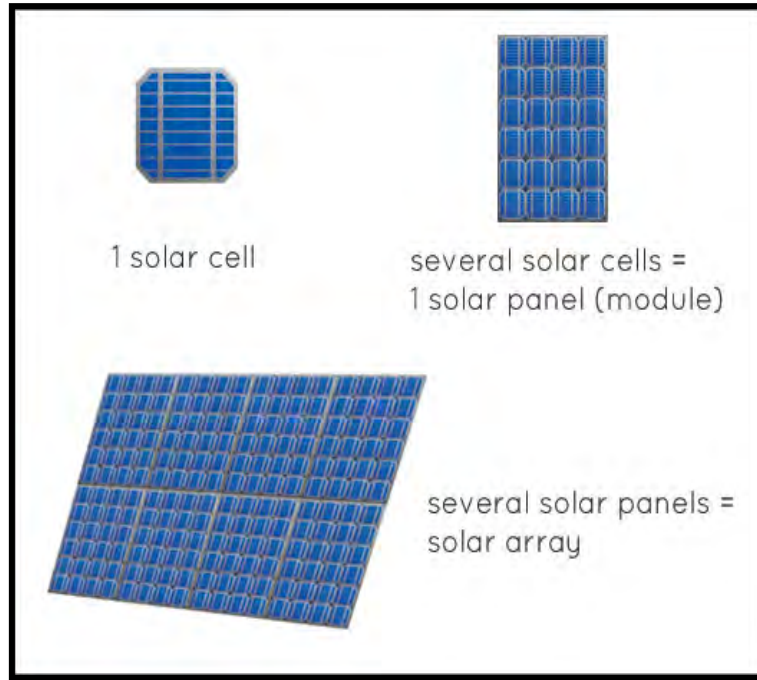


Figure 2.8: Components of the Proposed PV Installation (Source: Go Greena, 2013)

Modules are arranged into strings that form the solar field. Modules are arranged in section sizes of approximately 40 x 5 m called tables and are installed on racks which are made of aluminium or galvanised steel. The arrays and racks will be founded into the ground through either steel or concrete towers (which will be confirmed during the detailed engineering phase), as shown in Figure 2.9. The entire structure is not expected to exceed 10 m in height (measured from the ground), which is considered to be the worst-case scenario.

All the arrays will be wired to a converter station that converts DC into AC. Section 2.3.2.1 of this chapter provides additional detail regarding the converter station and connection thereto.



Figure 2.9: PV Technology

In terms of the composition of PV panels, the glass used to manufacture solar PV technology is designed to maximise absorption of light and minimise reflection, glint and glare (Spaven Consulting, 2011; BRE, 2013). Subsequently, solar PV panels are less reflective than water (Figure 2.10).

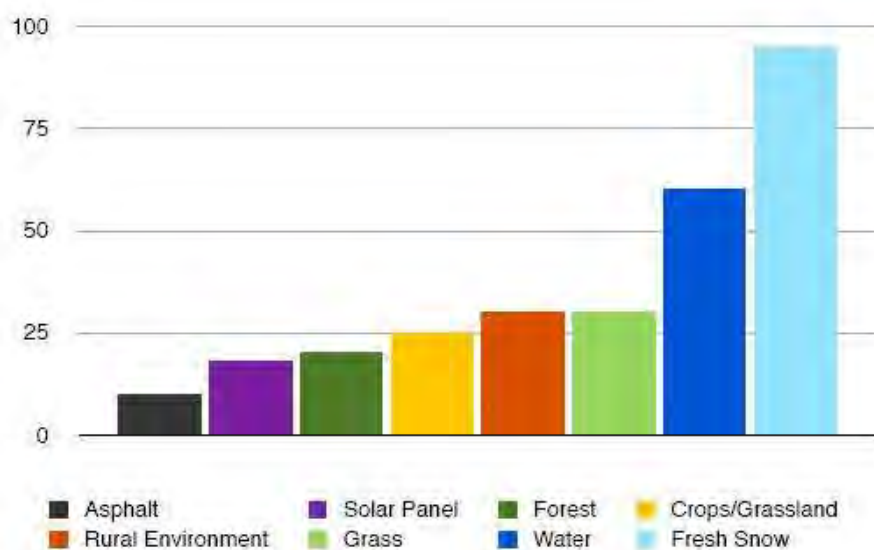


Figure 2.10: Reflected Energy Percentage of Solar Panels compared to other Materials (Source: Spaven Consulting, 2011)

The glare and reflectance levels from a given PV system are decisively lower than the glare and reflectance generated by the standard glass and other common reflective surfaces in the environments surrounding the given PV system. Possibilities of random glare and reflectance observed from the air: the PV industry has multiple large projects installed near airports or on air force bases. Each of these large projects has passed Air Force standards and all projects have been determined as “No Hazard to Air Navigation” (SUNPOWER, 2010)

Environmental Affairs Minister Edna Molewa has officially announced South Africa’s - first solar-powered airport in George on Friday, 26 February 2016. Most of the airport’s energy needs will be supplied through 200 square meters of photo-voltaic (PV) panels. She pointed out that “PV technology generates electricity from solar radiation providing a renewable and clean energy source. In its first phase, 750kw

will be generated which is sufficient to meet the airport's daily needs. This is expected to increase with plant capacity in future" (www.rnews.co.za/article/7951/george-airport-get-solar-power).

No known adverse effects associated with the possible reflection and glare from solar PV panels on livestock have been flagged in solar PV planning research. One of the benefits of solar PV fields is that the landscape becomes multi-functional: not only is electricity generated by the solar arrays, but livestock (especially sheep and even cattle, depending on the height of the solar arrays) can potentially utilise the area for grazing (Spaven Consulting, 2011; BRE, 2013). Any grazing potential amongst the panels will be determined by the project applicant at the commencement of the construction phase on a case by case basis. In addition, due to the low reflectivity of the panels compared to water, it is unlikely that birds will mistake it for water (Spaven Consulting, 2011; BRE, 2013).

2.3.1.2 Building Infrastructure

The solar field will require on-site buildings, including an operational and maintenance control centre, offices, warehouse/workshop (for storage of equipment), ablution facilities, inverter stations, on-site substation and substation building, on-site workers accommodation camp, laydown areas and security enclosures. The on-site substation is expected to extend approximately 30 m in height, with a maximum footprint of 100 x 100 m². The Visual Impact Assessment (Chapter 7 of this EIA Report) considered a height of 30 m for the on-site substation building, as a worst case scenario. Ablution facilities are likely to be incorporated into the office structures occupying an area of roughly 30 m x 30 m. The buildings will likely be single storey. The offices, operational and maintenance control centre, warehouse/workshop and operations offices are expected to extend approximately 7 m high. The inverter stations are expected to extend approximately 3 m high (with a maximum height of 7 m). Security will be required to guard the main facility and support infrastructure and therefore a guard cabin will also be constructed (with an approximate height of 3 m). The buildings are required to support the functioning of the facility and to provide services to personnel that will operate and maintain the facility. The building infrastructure for both technology types will be the same. Detailed design will follow as the development progresses.

2.3.2 Associated Infrastructure

2.3.2.1 Electrical Infrastructure

As mentioned above, the solar arrays are typically connected to each other in strings, which are in turn connected to inverters that convert DC to AC. The strings will be connected to the converter station by low voltage underground (internal) DC cables. Power from the inverter station will be collected in medium voltage transformers through underground (internal) AC cables or AC cables which are pole-mounted depending on voltage level and site conditions.

The Inverter Stations will in turn be connected to the proposed on-site substation, via medium voltage underground (internal) cables (22/33kV), which will increase the voltage and transmit the power produced via a 132 kV overhead transmission line into the national grid system via the Eskom Nieuwehoop substation which is currently under construction on the Remaining Extent of Portion 3 of Gembok Bult Farm 120. An overhead 132 kV transmission line (with a height of approximately 30 m) will be constructed for the Solar PV Facility and will extend between the proposed on-site substation and the Eskom Nieuwehoop Substation. It will be constructed with steel tower structures. Depending on the location of the substation on site, the length of the proposed overhead line, connecting the on-site substation to the Nieuwehoop Substation via the Gembok Solar PV1 Substation, is approximately 9 km. The transmission lines and electrical infrastructure required to connect the proposed projects to the national grid will be constructed within an electrical infrastructure corridor (extending between 300 m and 1 000 m wide).

It is proposed that Boven Solar PV4 (PTY) LTD will implement the Self-Build Option for the additional electrical infrastructure to be constructed (which includes the 132 kV transmission line and additional feeder bay(s), busbar(s), 400/132kV transformer and a transformer bay at the Eskom Nieuwehoop

Substation). Following the construction phase, the proposed transmission line will either be transferred into the ownership of Eskom or remain in the ownership of Boven Solar PV4 (PTY) LTD.

It is important to note that all transmission lines and the high voltage infrastructure leading up to the Point of Connection (i.e. Mulilo's section of the proposed collector substation) are covered by this EIA Process (i.e. for Boven Solar PV4). High voltage infrastructure extending from the Point of Connection (i.e. Eskom's section of the proposed collector substation) up to the line bay at the Eskom Nieuwehoop Substation may be handed over to Eskom.

2.3.2.2 Roads

The main access road will be the National Road, the R27, and an existing Transnet Service Road leading to the site or the unnamed farm road accessed by the R 383. Both routes will be considered in the design of the facility and have been included in the proposed project. The R27 extends from Keimoes, which is the most northern point of the road, to Vredendal in the south. The R27 is 6 m wide and falls within a 45 m road reserve. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The Transnet Service Road and unnamed farm road are 7-8 m wide. It is proposed that an internal gravel access road be constructed from this Transnet Service Road to the proposed site, should this option be chosen. This road is not expected to be more than 6 m wide. The length of the internal roads will be approximately 10 km.

Discussions have been initiated and held with Transnet and the Project Applicant during the Scoping and EIA Process regarding the potential use of the Transnet Road and associated specific requirements. Transnet have informed the Project Applicant of their requirements that need to be met by the Project Applicant should the Transnet Service Road be used as to gain access to the site. These requirements will be considered in the design of the facility where required, and the details of the agreement will be finalised outside of this EIA Process.

However, should the Transnet Service Road not be used for access to the preferred site, then the unnamed farm gravel road will be used and widened to approximately 6 m. Internal roads within the PV plant will be constructed within the project footprint.

The types of materials that will need to be transported to site during the construction phase include the following:

- Transformers;
- PV Modules;
- Inverter Stations;
- Steel and Aluminium for Racking;
- Switchgear and equipment;
- Cables;
- Gravel and sand;
- Concrete;
- Water;
- Reinforcement; and
- Other material.

During the operational phase, fewer materials will need to be transported to site. Trips will also be generated for the transportation of staff during the construction and operational phases.

2.3.2.3 Fencing

For various reasons (such as security, public protection and lawful requirements), the proposed facility will be secured via the installation of boundary fencing. The fencing is planned to be approximately 3 m high. Access points will be managed and monitored by an appointed security service provider. The type of

fencing is yet to be determined; however it may be a fully electrified option. Detailed design will follow as the development progresses.

2.3.2.4 Solar Resource Measuring Stations

Permanent solar resource measuring stations will be established on each site in order to measure incoming solar radiation levels. At this stage it is assumed that the measuring stations will have a footprint no larger than 9 m² and will extend 5 m in height.

2.3.2.5 Panel Maintenance and Cleaning

The accumulation of dust on solar panels generally negatively influences the productivity of the Solar Facility. As such the panels require r cleaning. Cleaning and maintenance of the panels will require water. A Geohydrological assessment was done for the Nieuwehoop Phase 1 Solar PV development, which is within the same project area. The study assessed the quality of the groundwater and its suitability for use. The Geohydrological Assessment determined that the groundwater on site is extremely low in terms of yields and is not suitable for use. The Project Applicant therefore does not intend to extract groundwater on site from boreholes to clean the solar panels, but instead intends to use municipal water that will be trucked in to site. This will be confirmed with the !Kheis Local Municipality. It is proposed that panel cleaning will take place twice per year; however this may be revised should the site conditions warrant more frequent cleaning. The water will be filtered through a Reverse Osmosis system before being used to clean the modules. No further treatment is necessary. The water evaporates within seconds and only contains dust contaminants/ bird droppings from the surrounding environment. It is therefore not required to treat the water after the washing of the panels. The municipal water will be stored on site in suitable containers during the operational phase. It is estimated that 700 kilolitres of water will be used annually for the cleaning of the solar panels and general employee usage during the operational phase (the project have a minimum lifespan of 20 years). It is estimated that 4 000 kilolitres of water will be used annually for construction (construction is planned to take 15 months).

2.3.2.6 Stormwater Channels

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

The proposed project may also entail the construction of drainage structures (i.e. French drains) for the transfer of waste water generated by the proposed facility. These structures may exceed 1 000 m in length, may have an internal diameter of 0.36 m or more, and possibly a peak throughput of 120 l/s or more.

The project will require sewage services during the construction and operational phases. Low volumes of sewage are estimated during both phases. Due to the remote location of the project site, a conservancy tank or septic tank system could be used on site, which is expected to be serviced by the municipality. Portable sanitation facilities could also be used during the construction phase, which will be regularly serviced and emptied by a suitable contractor.

In terms of waste generation, general waste generated during the construction and operational phases will be temporarily stored in a skip on site and periodically removed to a licenced waste disposal facility by a suitable contractor.

As discussed above, water will be supplied by the municipality and transported to the site via tankers. During the construction and operational phases, it is proposed to have 7 to 10 water tanks (i.e. suitable containers or reservoir tanks (or similar)) on site. The capacity of the tanks is estimated to be approximately 100 000 litres. During the construction phase, delivery of water will be required once every two days (via water tankers from the municipality). During the operational phase, water will be delivered twice a year (via water tankers from the municipality).

The project Applicant will consult with the municipality in order to confirm the supply of services (in terms of water, waste removal, sewage and electricity) for the proposed project.

2.3.3 Associated Infrastructure

A summary of the project components are shown in Table 2.3 below.

Table 2.3: Specifications of the Project Components

Component	Description
Solar Field: 220 ha	
Type of Technology	Solar PV Technology
Generation Capacity	75 MW and up to 100 MW DC
PV Panels Structure (with following possible tracking and mounting systems): <ul style="list-style-type: none"> • Horizontal Single axis tracking systems; • Fixed axis mounting structures; 	Height: 3 m (maximum)
Area of PV Array	Footprint: 220 ha
Total Surface Area to be covered (including all associated infrastructure and roads etc.)	Footprint: 25 ha
Building Infrastructure	
Offices	Height: 7 m Footprint: 30x30m
Operational and Maintenance Control Centre	Height: 7 m Footprint: 50 x 50 m
Warehouse/Workshop	Height: 7 m Footprint: 50 x 50 m
Ablution Facilities	Height: 5 m Footprint: 10 x 10 m
Inverter Stations x 100	Height: 3 m Footprint: 4 x 10 m
Number of Inverter Stations Required	100
On-site Substation and Substation Building	Height : 30 m Footprint : 100 x 100 m
Guard Cabin	Height: 3 m Footprint: 10m x 10m
Solar Panels	Height: 3 m Footprint: 220 ha
Solar measuring station	Height: 5 m Footprint : 9 x 9 m
Associated Infrastructure	
On-site substation	Capacity: 132KV
22/33 kV internal transmission lines/underground cables	Length: 10km
Underground low voltage cables or cable trays	Capacity: 380VAC and 1500V DC Depth belowground: 1 m
Access Roads: Unnamed Farm Road (Widening)	Length: 8 km Width: 6 m
Access Roads: Transnet Service Road	Length: 35 km Width: 8 m
Internal gravel access roads	Length: 10 km Width: < 8 m
Fencing	Type: Electrified Height: 3 m

Component	Description
Panel maintenance and cleaning area	Footprint: 5ha
Stormwater channels	Length: > 1000 m Width: <1 m
Temporary work area during the construction phase (i.e. laydown area)	Footprint: Maximum 20 ha
Permanent laydown area during the operational phase	Footprint: 5ha
High Voltage Overhead Transmission Lines	Height = 30 m Length = 9 km Footprint = 32 m servitude
Proximity to Grid Connection	Approximately 9 km

2.4 Overview of Project Development Cycle

The project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and has therefore been assessed by the specialist studies in the EIA Report.

2.4.1 Construction Phase

The construction phase will take place subsequent to the issuing of an EA from the DEA and a successful BID in terms of the REIPPP (i.e. the issuing of a PPA from the DoE). The construction phase is expected to be approximately 15 months for the proposed Solar PV Facility.

The construction phase will involve the transportation of personnel, construction material and equipment to the site, and personnel away from the site (the personnel that will not be accommodated on-site). In terms of site establishment, laydown areas will be required at the outset of the construction phase, as well as dedicated access routes from the laydown areas to the working areas. Haul roads for construction traffic (for the delivery of concrete, road materials and other construction materials) will be required, as described in Section 2.3.2.2 above.

The laydown area will either be located adjacent to or at the project site. It is expected that the laydown area will be temporary in nature (for the duration of the construction phase) and will include the establishment of the construction site camp (including site offices and other temporary facility for the appointed Contractors). The laydown area is expected to cover a maximum area of 20 ha. If the laydown area is located outside of the footprint of the Solar Facility itself, the area will thereafter be rehabilitated (i.e. returned to its pre-construction condition) at the end of the construction phase. It is planned that each PV facility will have its own site camp area.

All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the Environmental Management Programme (EMPr) which is included in Part B of the EIA Report. During the construction phase, both skilled and unskilled 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 between 60 and 90 skilled and 100 and 120 unskilled employment opportunities are expected to be created during the construction phase. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.

Additional details regarding the employment opportunities are provided in the Socio Economic Impact Assessment (Chapter 14 of this EIA Report). The employment creation is also dependent on the REIPPPP bidding requirements and the final engineering design.

The main activities that will form part of the construction phase are:

- Removal of trees and large bushes and ground-vegetation clearance for buildings and substations;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Construction of internal access roads where required;
- Stockpiling of topsoil and clearing of vegetation (only brush cut of tall bushes and clearing as necessary);
- Transportation of material and equipment to site; and
- Construction of the solar field (consisting of the solar arrays and buildings) and additional infrastructure.

2.4.2 Operational Phase

The proposed Solar PV Facility is expected to become operational by 2021. The following activities will occur during the operational phase:

- Generation of 75 MW of electricity to add to the national grid; and
- Maintenance of the Solar PV Facility, including washing of panels (as explained in Section 2.3.2.5).

The projected operations are expected to provide several services and added economic spin offs (as highlighted in Chapter 1 and in the Socio-Economic Impact Assessment in Chapter 14 of this of this EIA Report. The proposed Solar PV Facility is expected to generate electricity for a minimum period of 20 years. The operational phase of the project is expected to create skilled employment opportunities. However, other opportunities may arise for unskilled labour to be integrated to the ancillary activities. During the operational phase, approximately 5 skilled and 7 unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. Additional details regarding the employment opportunities are provided in the Socio-Economic Impact Assessment (Chapter 14 of this EIA Report).

2.4.3 Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition.

The plant will be decommissioned and the site rehabilitated. Components will be recycled where possible. Any financial provisions and requirements by the relevant authority (in terms of the legal provisions applicable at the time) for closure and post decommissioning management will be adhered to.

Should the unlikely need for decommissioning arise (i.e. if the Solar PV Facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and any legislation or guidelines relevant at the time and the site will be rehabilitated and returned to the pre-construction state.



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 3: Description of the Affected Environment

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3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter of the EIA Report provides a description of the biophysical, heritage and socio- economic environment that may be affected by the proposed Boven Solar PV4- Facility proposed by Boven Solar PV4 (Pty) Ltd near Kenhardt in the Northern Cape Province. This information is provided to identify the potential issues and impacts of the proposed projects on the environment. The information presented within this chapter has been sourced from:

- *Preliminary scoping input from the specialists that form part of the project team;*
- *Scoping inputs from the Scoping Report for the Mulilo Nieuwehoop Phase 1 Solar PV Facilities;*
- *Specialist studies inputs from the EIA Report;*
- *Review of information available on the South African National Biodiversity Institute (SANBI); Biodiversity Geographical Information System (BGIS) and Agricultural Geo-Referenced Information System (AGIS); and*
- *!Kheis Local Municipality and ZF Mgcawu District Municipality (previously known as Siyanda District Municipality) Integrated Development Plans (IDP) and the Northern Cape Provincial Spatial Development Framework (PSDF).*

Please note: *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 preferred project site (Boven Solar PV4) focused on significant environmental aspects of this project are provided in the relevant specialist studies (which are included in Chapters 7 to 14 of this EIA Report).*

3.1. Background

The proposed Boven Solar PV4 Facility is situated on the Remaining Extent of Boven Rugzeer Farm 169. The total farm property covers approximately 7 220 ha, and the preferred Boven Solar PV4 project site extends approximately 284 ha. As noted previously, the site is located approximately 30 km north-east of Kenhardt, in the ZF Mgcawu District Municipality and the !Kheis Local Municipality in the Northern Cape Province. The co-ordinates of the corner points of the preferred project area are provided in Chapter 2 (Table 2.2) of this EIA Report. Figure 3.1 provides a locality map of the proposed project area within a regional setting.

3.2. Preliminary Sensitivity Screening

Figure 3.1 represents the regional setting of the proposed Boven Solar PV4 project in terms of the surrounding sensitive ecosystem features and sensitive geographical areas in proximity to the site.

Based on the preliminary sensitivity screening undertaken for the site, the proposed project area does not fall within any threatened ecosystems, National Protected Areas, National Protected Area Expansion Strategy (NPAES) Focus Areas or areas of conservation planning. The closest protected area is approximately 115 km away from the proposed project site. This information has been confirmed in the Vegetation and Wetlands Impact Assessment (Chapter 8 of this EIA Report). An Ecological Support Area (i.e. a buffer around the Hartbees River) is located approximately 22 km southwest of the proposed project as part of the Namakwa District Biodiversity Sector Plan. There is no conservation plan for the !Kheis Local Municipality and the ZF Mgcawu District Municipality, hence Critical Biodiversity Areas are not present or defined. In terms of the National Biodiversity Assessment (NBA) (2011), rivers are classified into critically endangered, endangered, vulnerable and least threatened. Figure 3.1 shows the rivers that flow through the Gemsbok Bult Farm 120, one of which is a tributary of the river named

“Rugseers”. However, these rivers are classed as Not/Least Threatened. Refer to the Vegetation and Wetlands Impact Assessment (included in Chapter 8 of this EIA Report) for additional details regarding terrestrial and aquatic ecological sensitive features.

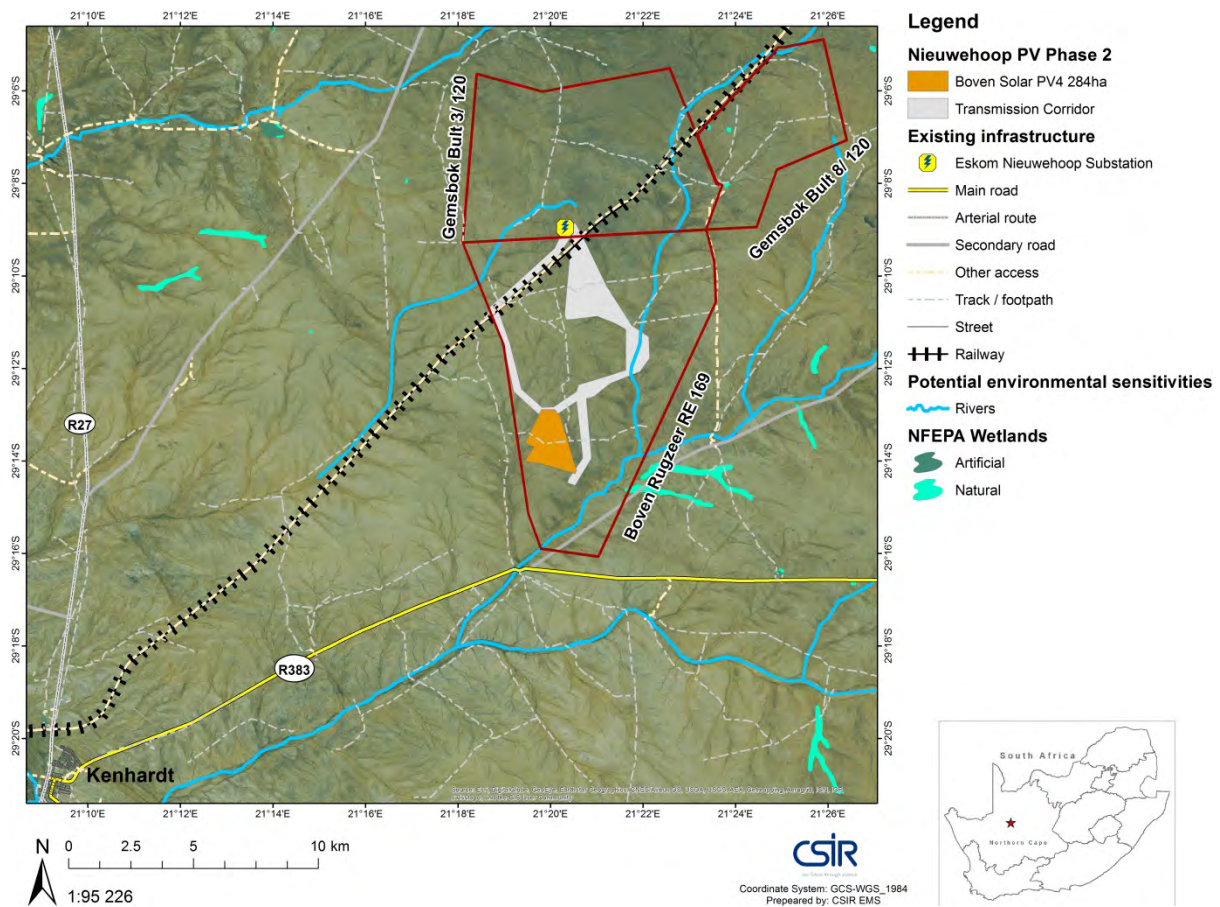


Figure 3.1: Regional Map showing the ecological features present on and close to the sites

3.3. Biophysical Environment

3.3.1. Climatic Conditions

The mean annual rainfall of South Africa is shown in Figure 3.2 below. The climate of the Northern Cape is semi-arid with a late summer-autumn rainfall regime. Average rainfall of the area, varies from 50 to 400 millimetres (mm) per year. Evaporation levels within this province exceed the annual rainfall. Climate conditions are extreme; very cold in winter and extremely hot in summer.

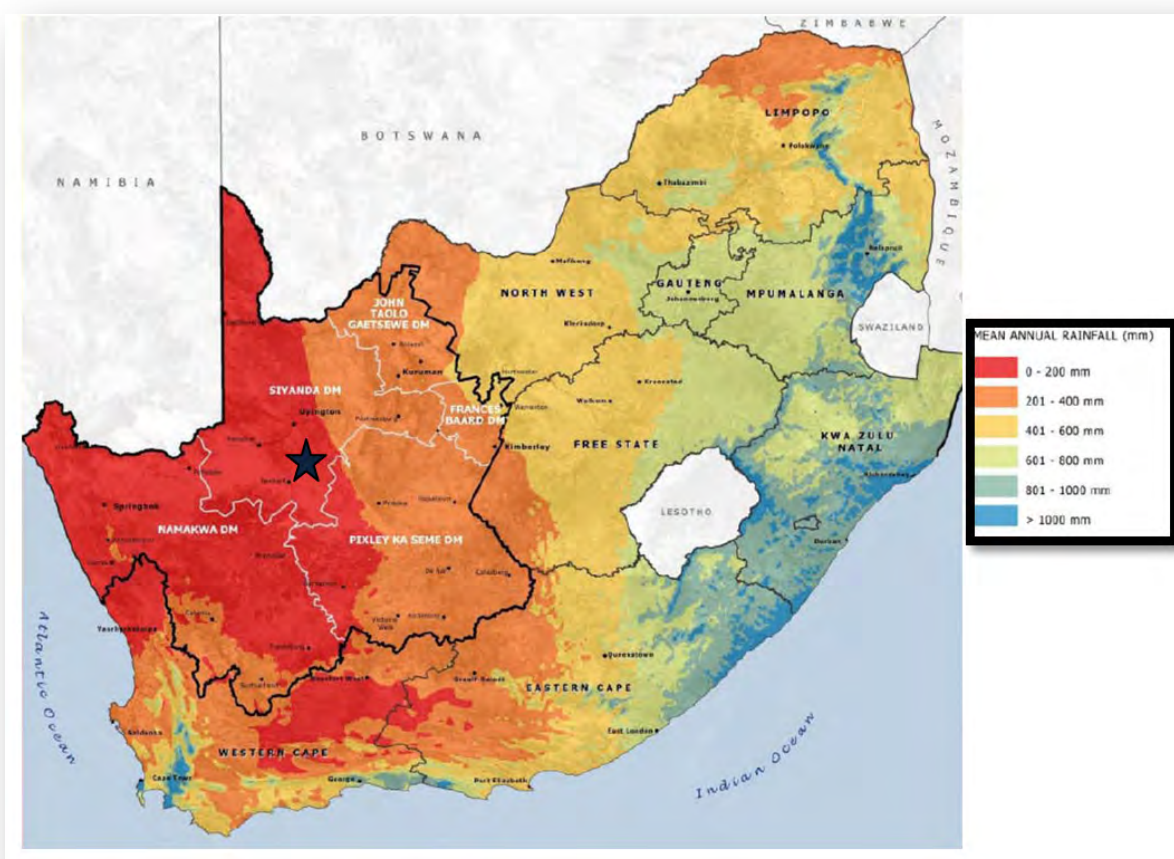


Figure 3.2: Map showing mean annual rainfall levels of South Africa (Source: Northern Cape PSDF, 2012)

The Kenhardt area (in which the proposed project sites fall) has a very low rainfall level, 183 mm per annum, with a standard deviation of 71 mm, according to the South African Rain Atlas (Water Research Commission, undated)¹. The average monthly distribution of rainfall is shown in Table 3-1.

Table 3.1: Average monthly rainfall for the site in mm (Water Research Commission, undated)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
25	33	38	24	11	5	3	4	5	8	11	16	183

Figure 3.3 shows the average monthly climatic chart for Kenhardt². As shown in this figure, the highest temperatures are reached in the summer months (December to January) and the lowest in the winter months (June to August). The average temperature of the area is 19.6°C, with an annual average high temperature of 28°C and an annual average low temperature of 11°C.

The average daily solar radiation levels in South Africa range between 4.5 and 6.5 kilowatt-hour per square meter (kWh/m²). In South Africa the measured solar radiation is the highest in the Northern Cape, North West Province and the Free State. As discussed in Section 2.1 of Chapter 2 of this EIA Report, the sites were selected because of the high solar radiation levels of the area (2 300 kWh/m² per annum or 6.3 kWh/m² per day).

¹ Data available online at: <http://134.76.173.220/rainfall/index.html>

² Data available online at: <http://www.climatedata.eu>

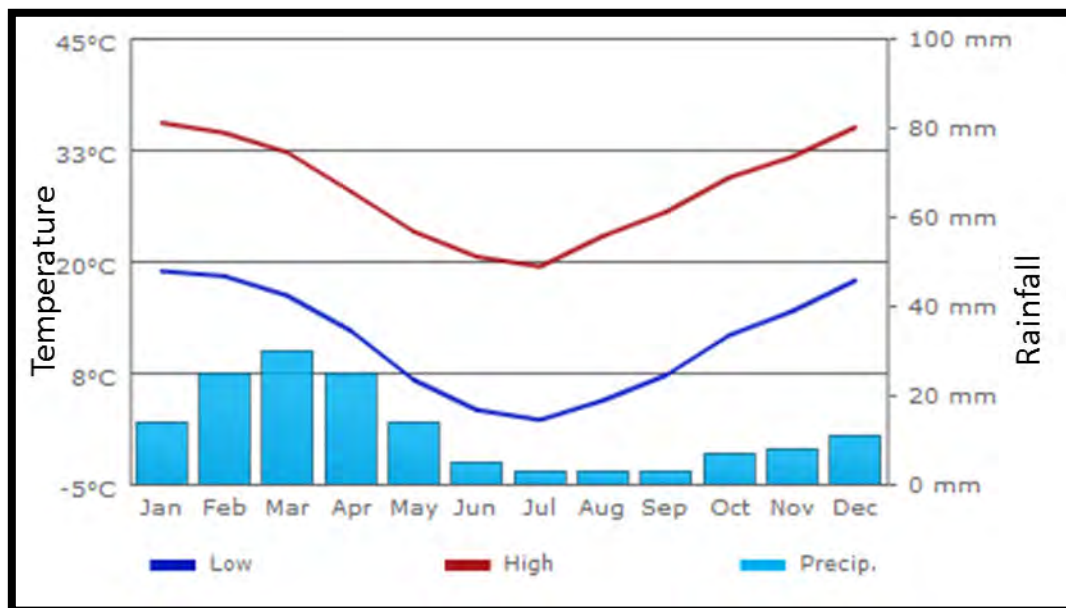


Figure 3.3: Climate chart for Kenhardt showing the maximum and minimum temperatures (lines) and the average rainfall for every month (bars) (Source: Climate data)

3.3.2. Topography

The topography of the region is flat with gentle, open undulations intersected with riverbeds and shallow drainage lines (N-S elevations ranging between 895 m and 1 018 m, W-E elevations ranging between 936 m and 1 000 m as shown in Figure 3.4 and Figure 3.5 respectively) (Holland, 2016)³.

The underlying geology of the sites belongs to the Vyfbeker Metamorphic Suite and represents supracrustal rocks (sediments which have undergone several episodes of metamorphism and deformation) of the Kakamas Terrane (Johnson, Anhaeusser, and Thomas 2006). Erosion resistant rocks of this suite form distinctive low rocky hills that are often visible in the distance, although none occur in the study area. Vegetation consists of low shrubs and grassland with occasional quiver trees (kokerboom), and produces a mottled background to most views which is effective at making some development types such as power lines and pylons blend in with the background (Holland, 2015).

³ Sourced from: Visual Impact Assessment for the proposed solar PV Projects for the Nieuwehoop Phase 2 Project, Kenhardt (Holland, 2016)

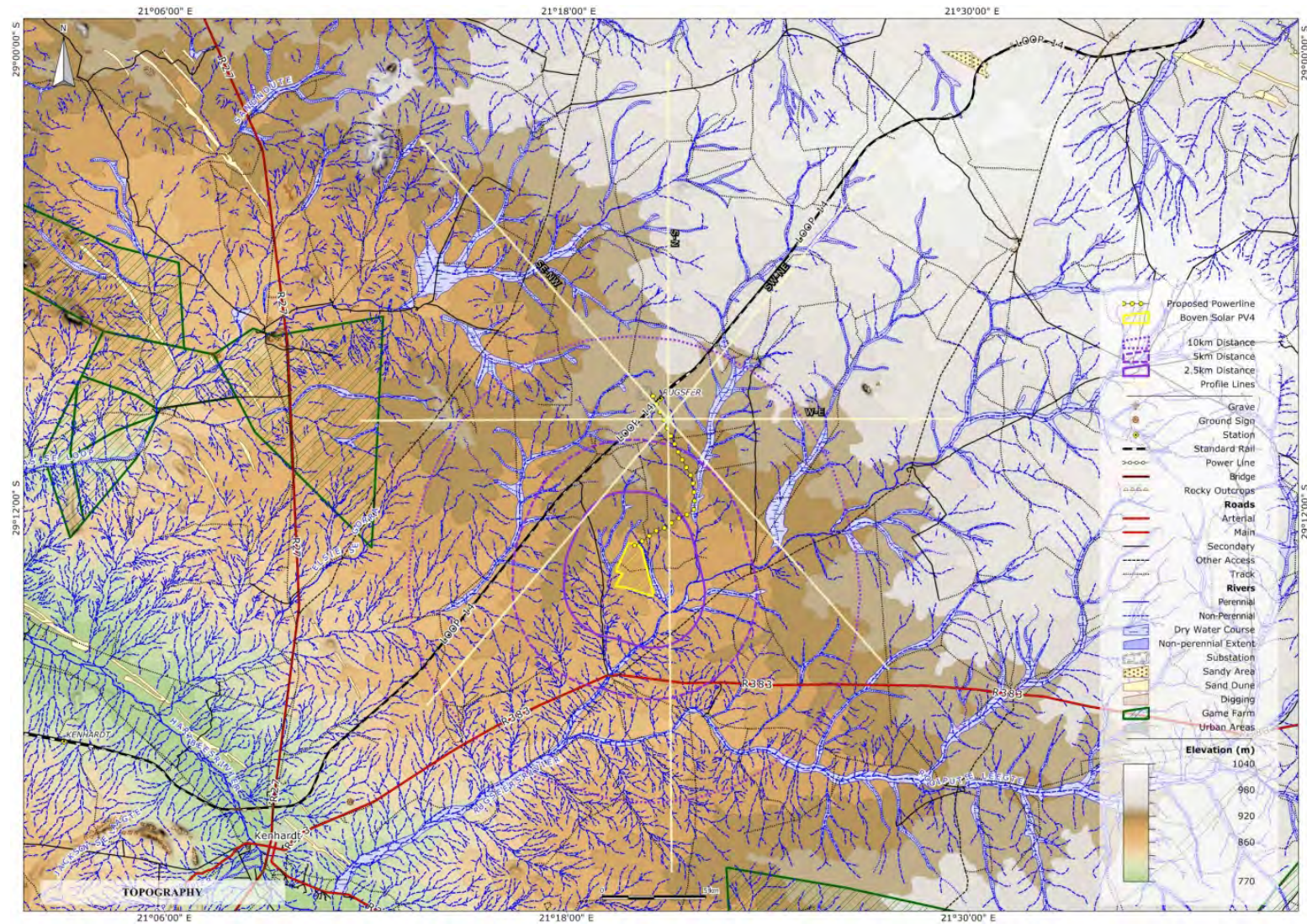


Figure 3.4: Topographic map of the region (Holland, 2016)

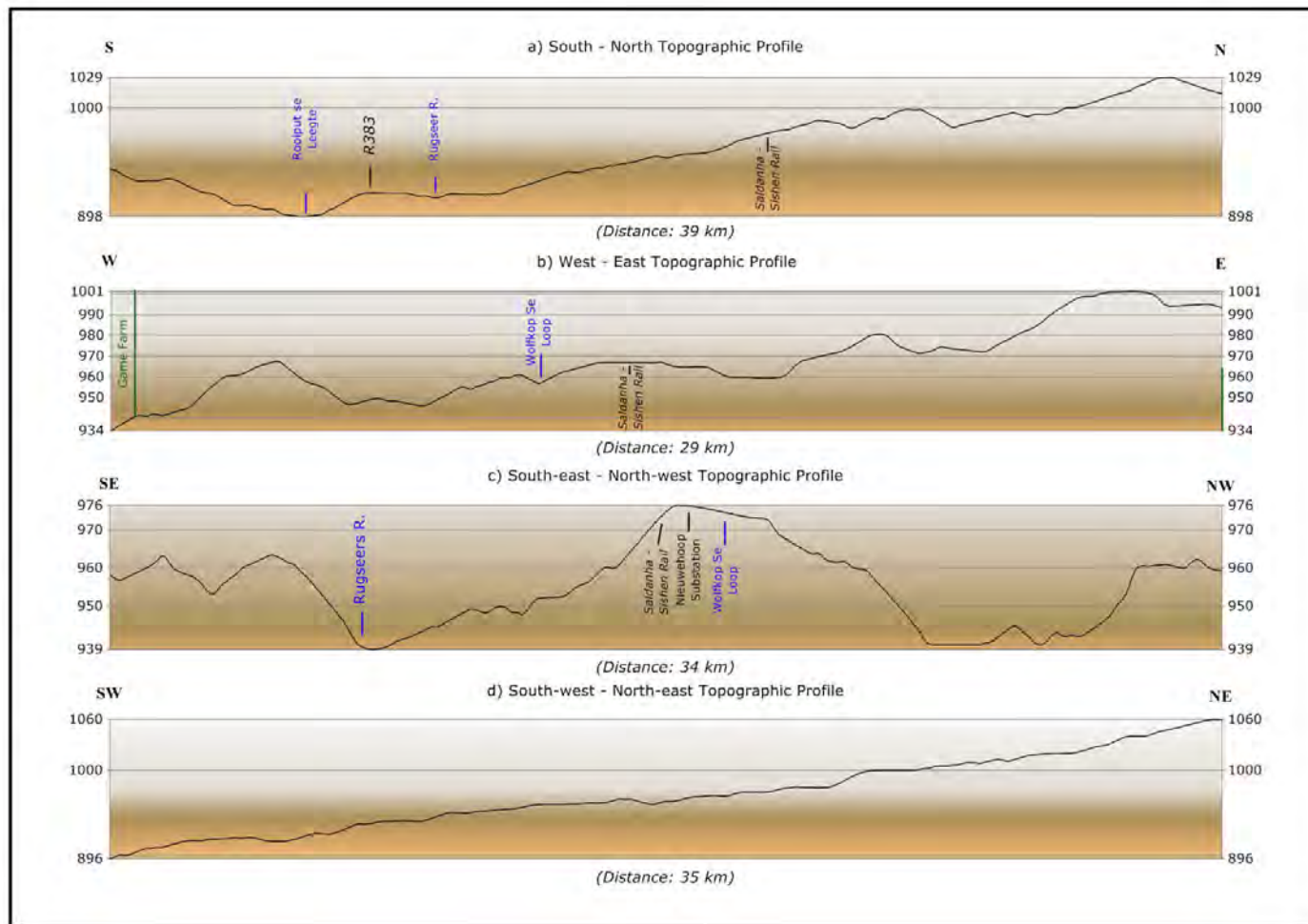


Figure 3.5: a) South-North Topographic Profile, b) East-West Topographic Profile, c) South-east – North-west Topographic Profile, d) South-west – North-east Topographic Profile. Topographic profiles as indicated on the topographic map above (Holland, 2016).

3.3.3. Geology and Soil Potential

3.3.3.1. Geological features

The Geological Survey of South Africa (now the Council for Geoscience) has mapped the area at 1:250 000 scale (2920 – Kenhardt). The geological features associated with the seven preferred sites are shown in Figure 3.6 and the main geology of the area is listed in Table 3-2, with the geological formations underlying the site highlighted in the table (GEOSS, 2014)⁴.

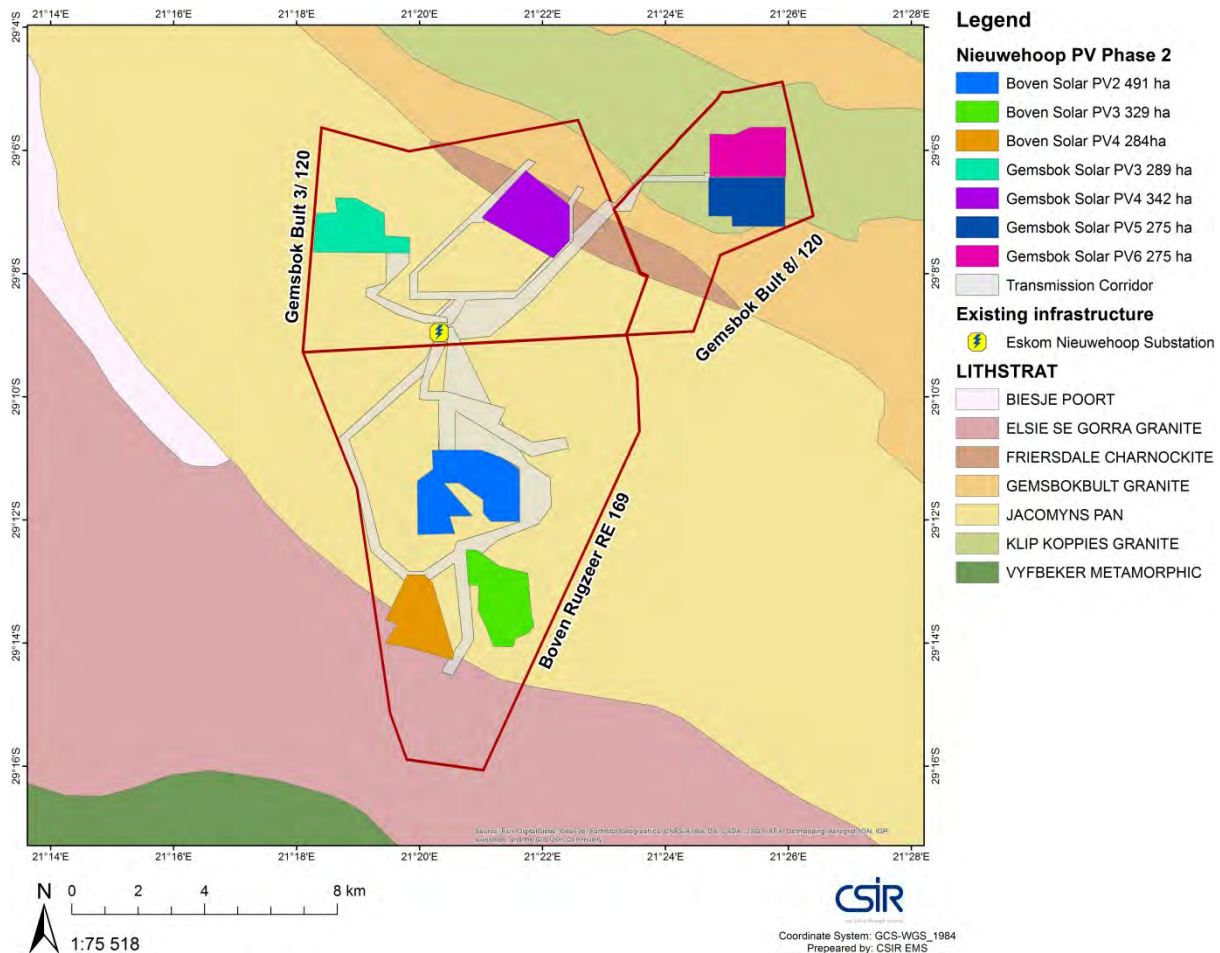


Figure 3.6: Geological setting of the development area (GEOSS, 2014)

The oldest rocks in the area comprise metamorphic gneisses (altered granite) which belong to the Jacomyns Pan Formation (Mja), upon which the Boven Solar PV4 Facility is situated. The Jacomyns Pan Formation is also part of the Jacomyns Pan Group. These rocks mainly occur in the southern and central portion of the study area. In the northern portion of the study area the granites of the Klip koppies Granite (Mks) and Friesdale Charnockite (Mf) outcrop occur. These two formations are part of the Keimoes Group. The hard rock outcrops are overlain by wind-blown sand (Qg) of the Gordonia Formation. The Gordonia Formation is part of the Kalahari Group. The stream channels are filled with alluvial material. There is no evidence of geological faulting in the area.

⁴ Sourced from: The rapid desktop geohydrological assessment - Solar PV Power Generation Projects - Northern Cape Report No: 2014/06/06 (GEOSS, 2014)

Table 3.2: Geological formations within the study area

Symbol	Name	Group	Description
Qg	Gordina Formation	Kalahari	Wind-blown dunes
Mf	Friesdale charnockite	Keimoes suite	Dark-coloured, fine grained charnockite with blue quartz
Mks	Klip koppies granite	Keimoes suite	Grey, fine to medium grained porphyritic granite
Mge	Gemsbokbult granite	Keimoes suite	Dark grey, medium grained granite with large xenocrysts
Mb	Brussel granite	Keimoes suite	Grey, fine to medium grained porphyritic granite
Me	Elsie se goria granite	Keimoes suite	Grey, medium grained granite, well-foliated.
Msa	Sandputs	Biesje poort	Grey to brown, fine grained weather calc-bearing quartzite
Mja	Jacomyns pan	Jacomyns pan	Pelitic gneisses with quartzite, leuco-gneiss, amphibolite and calc-silicate rocks.
Mke	Kenhardt migmatiet	Metamorphic suite	Migmatitic biotite gneiss, amphibolite, leucogneiss and porphyroblastic biotite.

3.3.3.2. Soil types analysis and soil potential

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. The proposed development (Boven Solar PV4) is predominantly on one land type, Ag6, with a very small portion in the north crossing over to a second, very similar land type, Ag5. These land types comprise predominantly shallow, red, sands to loamy sands on underlying rock, hard-pan carbonate, or hard-pan dorbank. The soils fall into the arid Silicic, Calcic, and Lithic soil groups according to the classification of Fey (2010). A summary detailing soil data for the land type is provided in Table 3-3. The field investigation confirmed that the soils on site are shallow, red sandy soils on underlying rock and hard-pan carbonate. Actual soil forms vary within short distances depending on rock ridges that run across the area and the extent of calcrete formation. There are numerous outcrops of rocky ridges at the soil surface across the entire area. All investigated sample points across the area were one of four soil forms: Coega, Mispah, Plooyberg or Hutton. However there is very little practical difference between these different soil forms. All have a clay content of approximately 7%, are shallow and are underlain by a hard impenetrable layer (either rock or hard-pan carbonate).

The land has low to moderate water erosion hazard, mainly due to the low slope, but is susceptible to wind erosion because of the sandy texture of the soil.

The biome classification for the sites is Bushmanland Arid Grassland (Lanz, 2015).

Table 3.3: Land type soil data for site

Land type	Land capability class	Soil series (forms)	Depth (cm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Ag6	7	Hutton	10-35	6-12	7-15	ca, so, db	43
		Mispah	5-15	5-12		R	14
		Mispah	5-15	5-12		ca	12
		Hutton	45->120	6-12	7-15	ca, so, R	10
		Hutton	10-35	10-20	15-25	ca, so, db	9
		Rock outcrop	0			R	8

Land capability classes: 7 = non-arable, low potential grazing land.

Depth limiting layers: R = hard rock; so = partially weathered bedrock; ca = hardpan carbonate; db = dorbank hardpan.

3.3.4. Agricultural Capability and Sensitivity

Land capability is the combination of soil suitability and climate factors. The area has a land capability classification, on the eight category scale, of Class 7 - non-arable, low potential grazing land. The limitations to agriculture are aridity and lack of access to water in addition to the shallow soil depth and rockiness. Because of these constraints, agricultural land use is restricted to low intensity grazing only. The natural grazing capacity is low, at mostly 31 - 40 hectares per animal unit. The current farmer uses an average stocking rate of 10 hectares per sheep (Lanz, 2016).

3.3.5. Regional Hydrogeology

According to the 1:500 000 scale groundwater map of Prieska (2920) the entire study area hosts an intergranular and fractured aquifer (i.e. the wind-blown sands and river alluvium as well as fractures within the bedrock constitutes an aquifer) with an average borehole yield of 0.1 ℓ/s to 0.5 ℓ/s (GEOSS, 2014).

With such low rainfall in the area, and thus associated low groundwater recharge conditions, it is anticipated that the groundwater quality will be poor.

A hydrocensus was conducted for the EIA of the Mulilo Nieuwehoop Phase 1 Solar PV Facilities near Kenhardt (GEOSS, 2014). It revealed that the potential for groundwater within the three areas designated for the solar PV projects is low in the western section and increases towards the east. The borehole yields sampled ranged from 0.04 – 1.2 L/s and of the thirteen sites, five boreholes were found to be dry. However, the water requirements for construction on the project sites are generally low (0.13 L/s assuming a 24 hour pumping cycle) and low yield boreholes found during the hydrocensus could meet the construction requirements.

The current preferred Boven Solar PV4 Project will not extract water from boreholes on site. Municipal water will be trucked in to site for construction and operational requirements.

3.3.6. Ecology-Aquatic and Terrestrial Environment

3.3.6.1. Aquatic environment

The Northern Cape can be divided into four Water Management Areas (WMAs), namely:

- Lower Orange;
- Upper Orange;
- Olifants/Doorn; and
- Lower Vaal.

The Boven Solar PV4 site falls within the Lower Orange WMA and within an Upstream WMA as determined during the National Freshwater Ecosystems Protected Areas (NFEPA) project⁵. The Orange River system drains 47 % of South Africa's surface area and is the river supporting the most water uses, including agricultural, mining, industry and municipal.

The proposed development site is dominated by species associated with the Nama Karoo (Bushmanland Arid Grassland) vegetation ecosystem from an aquatic vegetation point of view. These systems are thus usually devoid of any trees with strict riparian or wetland affiliations due to the largely ephemeral nature of the rivers/water courses within the region (Colloty, 2014)⁶.

3.3.6.2. Watercourses

The proposed Boven Solar PV4 site is located in quaternary catchment D53B, with a portion of the transmission line in D53C. The Department of Water and Sanitation (DWS) has compiled a Resource Quality Information Services (RQIS) database of different resources in South Africa. This system is not intended as an extension or replacement of NFEPA, but as a separate system. The Present Ecological State (PES) and Ecological Importance and Ecological Sensitivity (EI&ES) are included in this database and are used for the first level of a desktop ecological reserve determination and for Ecological Water Resource Monitoring (EWRM) (RQIS 2015). Based on the RQIS database the proposed site has a PES of B (Largely Natural), the EI is Moderate and the ES is Low.

Several watercourses are delineated on the 1:50 000 topographical maps of the area (Figure 3.7). These are non-perennial. The watercourse units, and associated vegetation unit, identified on site include:

- Non-perennial streams – Mostly vegetation Sub-unit 3.1 (*Prosopis glandulosa* watercourse);
- First order drainage lines – These units mostly correspond to vegetation Sub-unit 3.2 (*Rhigozum trichotomum* watercourse).

The *Prosopis glandulosa* watercourse is only present in the proposed transmission line area.

The non-perennial streams and the first order drainage lines have alluvial soils, although the soil is often very shallow in the non-perennial streams. The soil in the floodplain area is a deep sandy soil and better structured than the soil in the non-perennial streams. A clear change in vegetation is present in these units, also refer to the vegetation description in the Vegetation and Wetlands Assessment (Chapter 8 of this EIA Report).

The non-perennial stream can be classified as a riparian zone, but no aquatic assessments can take place due to the lack of water for most of the year. The floodplain zone is a marginal riparian zone. This section may occasionally be flooded during large rainfall events. These watercourses are of high conservation

⁵ Information can be accessed at: <http://bgis.sanbi.org/nfepa/project.asp>

⁶ Information sourced from: Aquatic Assessment Scoping Statement: Mulilo Niewehoop PV facility (Colloty, 2014)

importance, but have a moderate to high sensitivity due to the presence of *Prosopis glandulosa* and require a 32 m buffer zone. The estimate PES class of these units are B/C, also due to the high cover abundance of *Prosopis glandulosa*.

The first order drainage lines on site is mostly very narrow, in many cases only approximately 1 m wide and due to the scale of the assessment could not be delineated as a polygon feature. A line feature was however created for each of these systems. The drainage lines mostly have a clear change in vegetation dominance. These areas cannot be clearly defined as riparian or wetland areas, although some riparian characteristics are present. They are however definitely watercourses and are therefore of high conservation importance. These systems are mostly intact, with very few impacts and falls within PES class A. These drainage lines also require a buffer zone, but the buffer zone can possibly be decreased to a 20 m buffer zone.

3.3.6.3. The National Freshwater Ecosystem Priority Areas (NFEPA)

The National Freshwater Ecosystems Priority Areas (NFEPA) atlas indicates wetlands and three rivers in the immediate surroundings of the proposed Boven Solar PV4 site (see Figure 3.7). The river to the south of the site is the Rugszeersrivier, the other two are unnamed. These rivers are indicated as being in Class B, which is largely natural. There are, therefore, few impacts on the river systems in the area. These systems are non-perennial river systems and only flow during the rainy season.

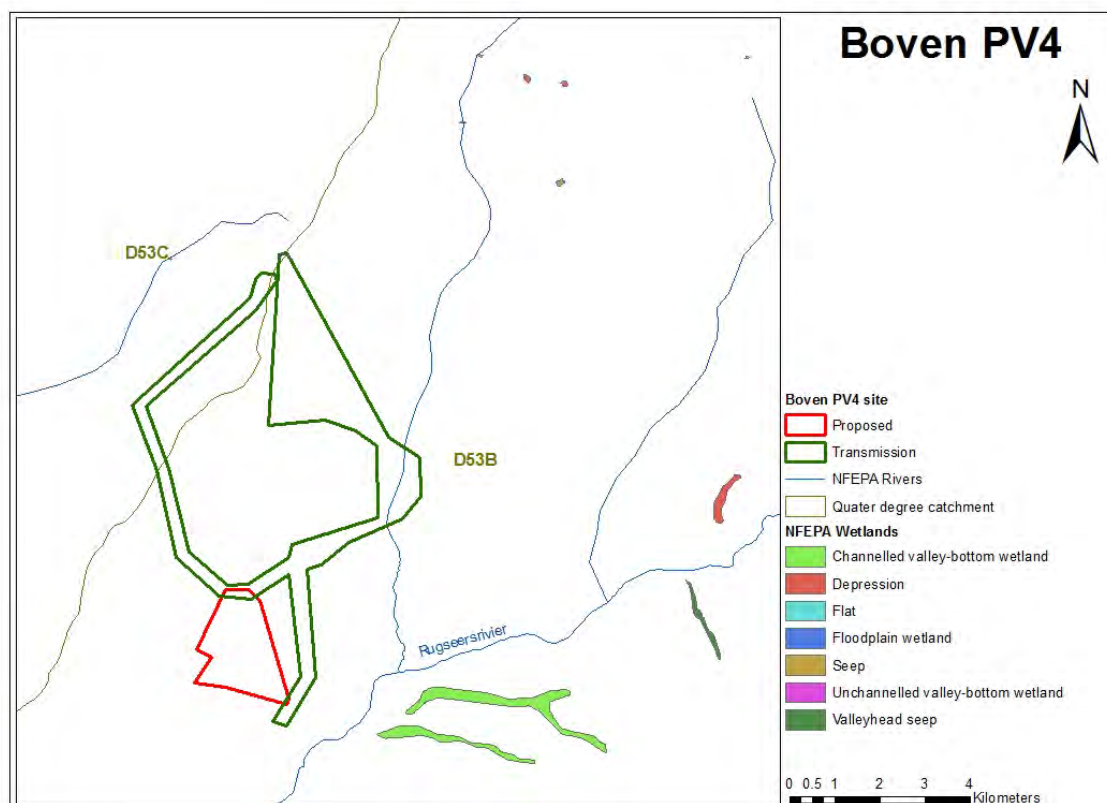


Figure 3.7: Recorded watercourses on site and around the site, including NFEPA and 1:50 000 topographic map watercourses (wetlands and rivers).

In conclusion, several watercourses are present in the area investigated and are considered to be sensitive. These areas must be avoided.

3.3.7. Terrestrial environment - Vegetation

3.3.7.1. General vegetation description

The vegetation on the Boven Solar PV4 site comprises the Bushmanland Arid Grassland (Mucina & Rutherford 2006) (Figure 3.8). This vegetation type is present in the Northern Cape Province, between Aggeneys and Prieska, to the north of the Bushmanland Basin and to the south of the desert vegetation. The vegetation type is located on plains, sparsely vegetated by grassland (dominated by *Stipagrostis* species) and with semi-desert characteristics. During years of abundant rainfall annual species flower abundantly. The soils are mostly a red-yellow apedal soil of less than 300 mm deep, but exceeding this depth in approximately a fifth of the area. The area has a low rainfall, with a mean annual precipitation (MAP) of between 70 and 200 mm. The vegetation type is classified as Least Threatened. Although a very small area is statutorily conserved, very few areas have been transformed.

A few vegetation units falling under the Bushmanland Vloere vegetation type (AZI5: Mucina and Rutherford 2006) is present a short distance outside the site investigated (Figure 3.8). Salt pans and broad riverbeds are included in this vegetation type, as well as several dysfunctional river tributaries. The vegetation type is present on flat and very even surfaces. The soil is mostly silt and clayey alluvial soils and often has a high salt content. In some areas, erosion can be considerable. The vegetation type is classified as Least Threatened in Mucina and Rutherford (2006).

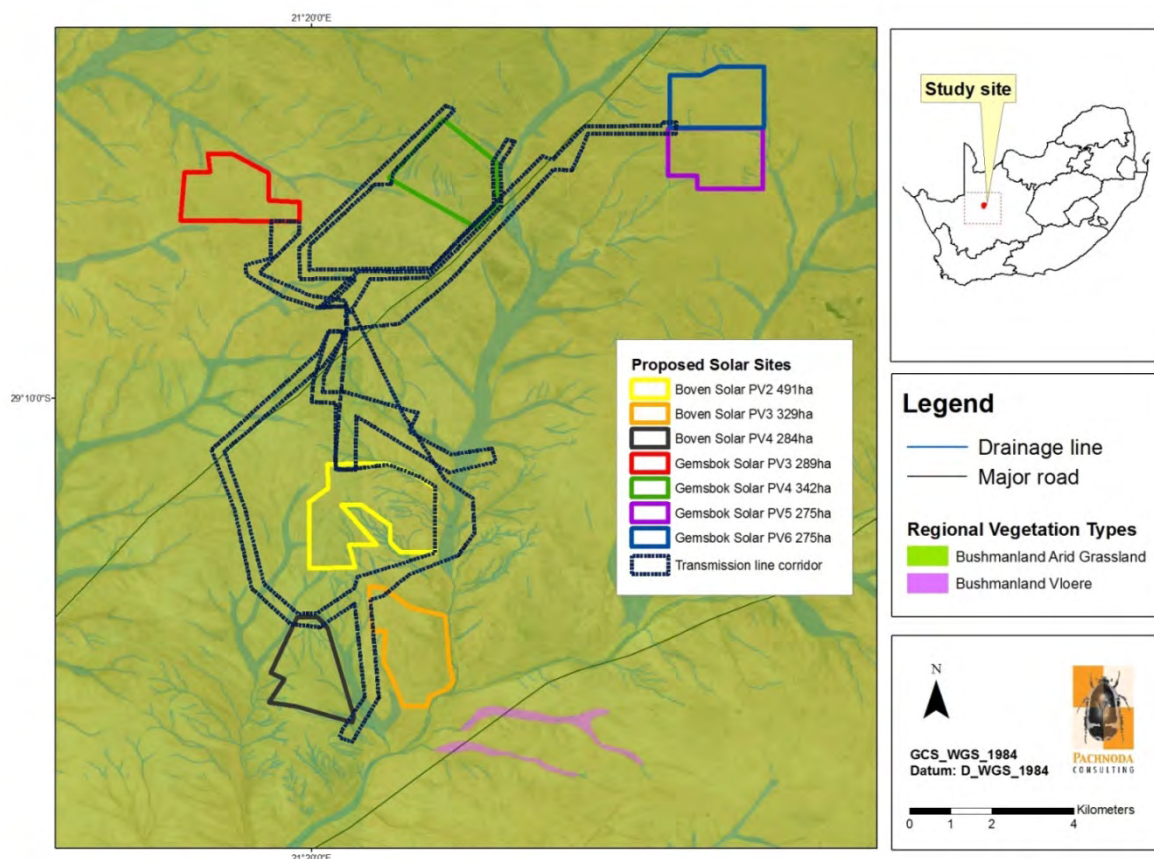


Figure 3.8: The vegetation types in the broader study area

3.3.7.2. Invasive species

The Alien and Invasive Species (AIS) Regulations were published in the Government Gazette of 1 August 2014. The regulations are published under the National Environmental Management Biodiversity Act (Act no 10 of 2004) (NEMBA). The only invasive species recorded on site is *Prosopis glandulosa*, which is dominant along the drainage lines adjacent to dams. A few individuals are scattered in small patches of disturbance.

3.3.7.3. Medicinal species

South Africa has a wide diversity of plant species and a rich cultural heritage. A large number of species is still used in traditional medicine and several species were also investigated for medicinal development. Indigenous vegetation is mostly used, but a few alien species are also used for medicinal purposes. The species *Dicoma capensis* ("koorsbossie") is present on site. Although this species has medicinal uses, there are no signs of use and the species is common. This is therefore not a significant impact.

3.3.7.4. Species of Conservation Importance

A list of species that has been recorded in quaternary catchments 2921AA, 2921AB, 2921AC and 2921AD was downloaded from SIBIS. These species were compared to the IUCN Red Data lists. Species of conservation importance that were recorded in these quarter degree grids are recorded in Table 3-4 below. The possibility that the species may be present on the site was assessed based on the habitat visible on the aerial photographs of the sites. The species *Aloe dichotoma* was observed on site. *Aloe dichotoma* is a Vulnerable species, which is specially protected under the Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA). The removal or movement of this species will require a permit from Cape Nature. Obtaining a permit for the removal of *Aloe dichotoma* is likely to be problematic. The species will have to be moved to appropriate habitat outside the proposed development area. This will require planning that takes the seasons and rainfall into account.

Hoodia gordonii is a Data Deficient species, but is protected under NEMBA and specially protected under the NCNCA.

It is also likely that *Dinteranthus pole-evansii* may be present on site on the quartz outcrops on site. The species is very inconspicuous and would be very difficult to observe when not in flower. A search should therefore be conducted for the species during the flowering season should development take place on the quartz outcrops.

Table 3.4: Species of conservation importance recorded in the area

Family Name	Species Name	IUCN	Habitat	On site?
FABACEAE	<i>Vachellia erioloba</i> (= <i>Acacia erioloba</i>)	Declining	Deep sandy soil in open savanna and on alluvial soils. Adapted to dry conditions.	None observed
ASPHODELACEAE	<i>Aloe dichotoma</i>	Vulnerable (VU)	Present in rocky hills in arid areas.	Yes, observed on site
MESEMBRYANTHEACEAE	<i>Dinteranthus pole-evansii</i>	VU	Well-drained, sandy soils associated with quartz stones and pebbles.	Unlikely
APOCYNACEAE	<i>Hoodia gordonii</i>	Data Deficient - Insufficient Information (DDD)	Occurs in a wide variety of arid habitats from coastal to mountainous, also on gentle to steep shale ridges, found from dry, rocky places to sandy spots in riverbeds.	Possible, none observed

Family Name	Species Name	IUCN	Habitat	On site?
ASTERACEAE	<i>Senecio glutinarius</i>	Data Deficient - Taxonomically Problematic (DDT)	Rocky areas.	None observed

In addition, *Boscia albitrunca* and *foetida* were observed on site. *Boscia albitrunca* is a protected species under the National Forest Act (Act 84 of 1998 (NFA), as well as the NCNCA, and *Boscia foetida* is protected under the NCNCA. *Boscia albitruca* is fairly rare, with less than one individual present per 50 ha. *Boscia foetida*, a similar species, are much more abundant. The individuals of *Boscia albitruca* are on average approximately 2 m high, with a stem circumference of approximately 300 to 400 mm.

3.3.8. Terrestrial environment - Fauna

3.3.8.1. Mammal species of conservation concern

The area is relatively remote which explains low richness of observed mammal taxa for the area. Only 11 species are known to be sympatric to the study area (according to QDC 2921AB & 2921AD), which include one species (*Crocidura cyanea*, Reddish-gray Musk Shrew) that is data deficient (Table 3-5). Most of the observed taxa are small-bodied murid or rodent taxa and elephant-shrews.

Table 3.5: The observed mammal taxa confirmed from two quarter-degree grid cells 2921AB and 2921AD that are sympatric to the study area (data courtesy of MammalMap, ADU)

Family	Genus	Species	Common name	Red list category
Macroscelididae	<i>Elephantulus</i>	<i>rupestris</i>	Western Rock Elephant Shrew	Least Concern
Macroscelididae	<i>Macroscelides</i>	<i>proboscideus</i>	Short-eared Elephant Shrew	Least Concern
Molossidae	<i>Tadarida</i>	<i>aegyptiaca</i>	Egyptian Free-tailed Bat	Least Concern
Muridae	<i>Aethomys</i>	<i>namaquensis</i>	Namaqua Rock Mouse	Least Concern
Muridae	<i>Desmodillus</i>	<i>auricularis</i>	Cape Short-tailed Gerbil	Least Concern
Muridae	<i>Gerbilliscus</i>	<i>brantsii</i>	Highveld Gerbil	Least Concern
Muridae	<i>Gerbilliscus</i>	<i>paeba</i>	Paeba Hairy-footed Gerbil	Least Concern
Muridae	<i>Gerbilliscus</i>	<i>vallinus</i>	Brush-tailed Hairy-footed Gerbil	Least Concern
Muridae	<i>Rhodomys</i>	<i>pumilio</i>	Xeric Four-striped Grass Rat	Least Concern
Nesomyidae	<i>Malacothrix</i>	<i>typica</i>	Large-eared African Desert Mouse	Least Concern
Soricidae	<i>Crocidura</i>	<i>cyanea</i>	Reddish-gray Musk Shrew	Data Deficient

The low richness as documented by Mammal Map is an artifact of the remoteness of the study area. However, more surveys in the area are likely to show that approximately 45 mammal species are expected to occur, of which 24 (53.3 %) species were confirmed during the current survey (Table 3.6). However, six of the species expected to be present show distribution ranges peripheral to the region and are probably rare in the area. Among those confirmed were three antelopes, six rodents, three canines (jackals), one specialised hyaenid, one leporid (hare), one elephant-shrew, three herpestids (mongoose), aardvark, two chiropterans (bats), one felid (cat), one viverrid (genet) and one hyrax.

Results obtained from the survey showed that the study area sustains a high mammal richness. In addition, the observed richness is encouraged by a gradient in soil texture (e.g. sand, loam and calcrete soils), the presence of outcrops (which also increase spatial heterogeneity and small mammal diversity) and the compactness of the soils. However, part of the high species richness is also explained by the low density of the human population in the area that often contributes to persecution and local extirpation of

selected species (mainly “problem” taxa such as scavengers). However, part of the mammal composition is unfortunately skewed by sheep farming practices (e.g. the fences) which have reduced the population’s size of medium-sized scavengers.

Table 3.6: Inventory of mammals observed in the study area during 04 – 11 December 2015

Scientific Name	Vernacular Name	Observed Indicator	Observed Habitat
<i>Antidorcas marsupialis</i>	Cape Springbok	Visual sightings/camera trapped	Open shrubveld, in particular on the southern sites near the large <i>Roepera morganiana</i> floodplain.
<i>Canis mesomelas</i>	Black-backed Jackal	Visual sightings	Widespread, although occurring at low densities, probably as a result of sheep farming practice.
<i>Cynictis penicillata</i>	Yellow Mongoose	Visual sightings/camera trapped	Widespread.
<i>Elephantulus rupestris</i>	Western Rock Sengi	Visual sightings	Localised, restricted to prominent outcrops.
<i>Felis cf. sylvestris lybica</i>	African Wild Cat	Spoor/scats	Localised.
<i>Galerella pulverulenta</i>	Small Grey Mongoose	Visual sightings/camera trapped	Widespread.
<i>Genetta genetta</i>	Small-Spotted Genet	Spoor	Widespread.
<i>Hystrix africaeaustralis</i>	Cape Porcupine	Burrows/quills/visual sightings/camera trapped	Widespread and abundant.
<i>Lepus capensis</i>	Cape Hare	Dropping/ visual sightings/camera trapped	Widespread.
<i>Micaelamys namaquensis</i>	Namaqua Rock Mouse	Trapped	Common on outcrops.
<i>Nycterus thebaica</i>	Egyptian Slit-faced Bat	Ultrasonic detection	Localised at prominent outcrops.
<i>Neoromicia capensis</i>	Cape Serotine Bat	Ultrasonic detection	Widespread, roost in roofs of farm buildings and in infrastructure at artificial watering points.
<i>Oryzomys afer</i>	Aardvark	Burrows/camera trapped	Widespread on shrubveld plains with sandy soils.
<i>Otocyon megalotis</i>	Bat-eared Fox	Visual sightings/camera trapped	Widespread, mainly on shrubveld.
<i>Parotomys brantsii</i>	Brants' Whistling Rat	Dens	Widespread and abundant.
<i>Pedetes capensis</i>	Springhare	Visual sightings/burrows	Widespread, mainly on open shrubveld with sandy soils.
<i>Procapra capensis</i>	Rock Hyrax	Visual sightings	Localised at prominent outcrops.
<i>Proteles cristatus</i>	Aardwolf	Visual sightings	Localised, occur in low densities.
<i>Raphicerus campestris</i>	Steenbok	Visual sightings/camera	Widespread.

Scientific Name	Vernacular Name	Observed Indicator	Observed Habitat
		trapped	
<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Mouse	Visual sightings (a diurnal species)	Widespread.
<i>Suricata suricatta</i>	Suricate	Visual sightings/dens	Confined to overgrazed areas and calcrete plains.
<i>Sylvicapra grimmia</i>	Common Duiker	Spoor/droppings	Widespread.
<i>Vulpes chama</i>	Cape Fox	Spoor/visual sightings/camera trapped	Widespread and abundant.
<i>Xerus inaurus</i>	South African Ground Squirrel	Visual sightings/dens	Widespread on calcrete and disturbed areas.

3.3.8.2. Species of conservation concern

The study area is likely to support habitat for three regionally Near Threatened (Honey Badger *Mellivora capensis*, Littledale's Whistling Rat *Parotomys littledalei* and Lesueur's Wing-gland Bat *Cistugo lesueuri*) and two Data Deficient species (Reddish-Grey Musk Shrew *Crocidura cyanea* and Lesser Red Musk Shrew *C. hirta*) (according to Friedmann and Daly, 2004). However, three of these are peripheral and probably absent (Littledale's Whistling Rat, *Parotomys littledalei*, Lesueur's Wing-gland Bat, *Cistugo lesueuri* and Lesser Red Musk Shrew, *Crocidura hirta*, while two have a high probability of occurrence:

Honey Badger (*Mellivora capensis*)

The honey badger is listed as "Least Concern" on the global IUCN Red List although Friedmann and Daly (2004) have listed it as "Near-Threatened".

Honey badgers are widespread and generally very catholic in their habitat requirements. They are predominately nocturnal, solitary, and generally very unobtrusive in behavior (Skinner and Chimimba, 2005). This species is expected to be present in the study area due to its unobtrusiveness and tolerance for human-modified habitat types. Based on its opportunistic behavior, it is likely to occur in all of the habitat types present.

Please note that the regional conservation status of *M. capensis* is currently under revision, with supporting evidence suggests that it will be downgraded from Near Threatened to Least Concern (pers. comm., M. Child of EWT).

"Data Deficient" species"

All shrew species of the genus *Crocidura* are regionally "Data Deficient" of which *C. cyanea* (which is known to be present in the QDS that overlaps with the study area) is considered to be widespread in the study area. Most shrew species are perceived to be relatively abundant, but modifications of suitable habitat (due to agricultural intensification and anthropogenic development) in combination with the paucity of scientific information on meta-population demographics place these species in the "Data Deficient" category.

3.3.8.3. Amphibians of conservation concern

No amphibian species were recently observed in the study area (*sensu* FrogMap and Minter *et al.*, 2004). The observed absence and very low expected richness is best explained by the absence of any permanent and discrete seasonal habitat features holding surface water. The only species that could peripherally be present are *Poyntonophrynus vertebralis* (Southern Pygmy Toad), *Vandijkophrynus garipeensis*

gariensis (Karoo Toad), *Cacosternum boettgeri* (Boettger's Caco) and possibly also Tandy's Sand Frog *Tomopterna tandyi*.

Currently, none of the frog species with distribution ranges peripheral to the study area is Threatened or Near-Threatened (Measey, 2010) and the area is not considered as an important zoographic region for amphibian diversity.

3.3.8.4. Reptiles of conservation concern

The relatively isolated spatial position of the study area is responsible for the paucity of observed reptile taxa. Only five species are known to be sympatric to the study area (according to QDC 2921AB & 2921AD; Table 3-7). However, this richness should be higher, and additional surveys in the area are likely to produce 35 expected species (inferred from distribution ranges in Bates et al., 2015), of which 12 species were confirmed during the survey undertaken in December 2015 (Appendix 2 and Figure 10.9 of Chapter 10 of the EIA Report):

- Leopard Tortoise *Stigmochelys pardalis* – widespread in study area;
- Verrox's Tent Tortoise *Psammobates tentorius verroxii* – localized and observed from the *Aloe dichotoma* granite outcrops;
- Karoo Sand snake *Psammophis notostictus* – widespread;
- Spotted Desert Lizard *Meroles suborbitalis* – widespread and abundant;
- Western Sandveld Lizard *Nucras tessellata* – localized on northern area consisting of *Aloe dichotoma* granite outcrops;
- Common Sand Lizard *Pedioplanis lineocellata pulchella* – widespread;
- Karoo Girdled Lizard *Karusasaurus polyzonus* – confined to granite outcrops with exfoliating sheet-rock;
- Western Rock Skink *Trachylepis sulcata sulcata* – common on outcrops;
- Variegated Skink *Trachylepis variegata* – mainly confined to low outcrops;
- Ground Agama *Agama aculeata aculeata* – widespread on calcrete and shrubveld with compacted soils;
- Common Giant Gecko *Chondrodactylus angulifer angulifer* – widespread; and
- Spotted Barking Gecko *Ptenopus garullus maculatus* – uncommon on sandy areas.

According to a recent conservation assessment (*sensu* Bates et al., 2014), no Threatened or Near-Threatened reptile species are present in the study area.

Table 3.7: The observed reptile taxa confirmed from two quarter-degree grid cells 2921AB and 2921AD that are sympatric to the study area (data courtesy of ReptileMap, ADU)

Family	Genus	Species	Subspecies	Common name	Red list category
Agamidae	<i>Agama</i>	<i>aculeata</i>	<i>aculeata</i>	Common Ground Agama	Least Concern
Elapidae	<i>Naja</i>	<i>nigricincta</i>	<i>woodi</i>	Black Spitting Cobra	Least Concern
Gekkonidae	<i>Chondrodactylus</i>	<i>bibronii</i>		Bibron's Gecko	Least Concern
Scincidae	<i>Trachylepis</i>	<i>sulcata</i>	<i>sulcata</i>	Western Rock Skink	Least Concern
Testudinidae	<i>Psammobates</i>	<i>tentorius</i>	<i>verroxii</i>	Verrox's Tent Tortoise	Not listed

3.3.9. Avifauna

According to the South African Bird Atlas Project (SABAP1: Harrison *et al.*, 1997), and SABAP2, approximately 91 bird species⁷ have been recorded from the quarter degree grid cells (2921AD Witdorp & 2921AD Steynsput) and pentad grids that overlaps with the study area (range = 63-75 species; see Table 3.8). This equates to a mere 9.4 % of the approximate 970 species listed for the southern African subregion⁸. The area was poorly surveyed during SABAP2 database, of which only three of the seven pentad grids that correspond to the study site were surveyed. According to the SABAP2 database, the study area is more likely to sustain an average of 22.2 species per pentad grid (www.sabap2.adu.org.za). The SABAP2 statistic was obtained from three pentad grids representing three independent observations⁹. However, 88 species were observed in the study area during the survey (December 2015) which effectively corresponds to 96.7 % of the number of species expected to be present (see Appendix 2). On a national scale, the species richness in the study area is considered low. At a national scale, the species richness of the study area is considered low (see Figure 3.9).

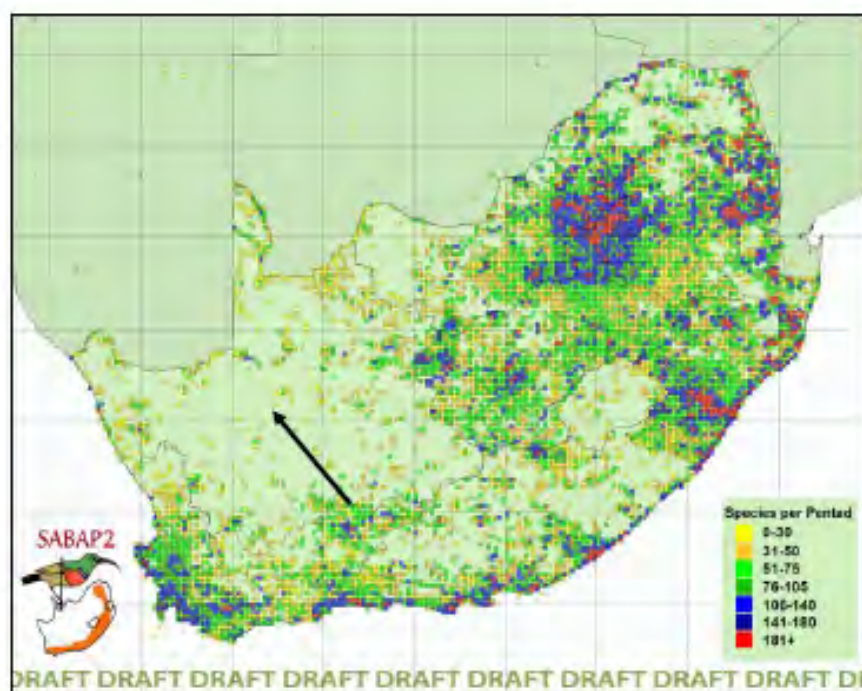


Figure 3.9: The bird species richness per pentad grid in comparison to the study area (see arrow) (map courtesy of SABAP2 and the Animal Demography Unit). According to the SABAP2 database, the study area hosts between 0-30 species

⁷ Sclater's Lark (*Spizocorys sclateri*) was added to the list although it was not recorded during SABAP1 and SABAP2. It was added to the analysis since it has a high probability to occur.

⁸ A geographical area south of the Cunene and Zambezi Rivers (includes Namibia, Botswana, Zimbabwe, southern Mozambique, South Africa, Swaziland and Lesotho).

⁹ Totals range between 17 and 30 species listed during an independent observation.

A summary of the total number of species, Red Listed species (Taylor *et. al.*, 2015); IUCN, 2015), endemics and biome-restricted species (Marnewick *et al.*, 2015) expected to occur and observed within the study area (Table 3.8)

The area was poorly represented by endemic bird species, but showed a moderate to good representation of biome-restricted near-endemic species, respectively (Table 3.8 and Table 3.9).

Table 3.8: Summary of the total number of species, Red Listed species (Taylor *et. al.*, 2015); IUCN, 2015), endemics and biome-restricted species (Marnewick *et al.*, 2015) expected to occur and observed within the study area. Values in brackets refer to the percentage of expected species that were observed during the survey.

Parameter	Expected	Observed
Total number of species	91	88 (96.7 %)
Number of Red Listed species (Taylor, <i>et al.</i> 2015) & IUCN, 2015)*	8	5 (62.5 %)
Number of biome-restricted species (Marnewick <i>et al.</i> , 2015 – Namib-Karoo and Kalahari Highveld)**	14	11 (78.5 %)
Number of restricted-range species (Marnewick <i>et al.</i> , 2015)	1	1 (100 %)
Number of endemics (Hockey <i>et. al.</i> , 2005)	23	19 (82.6 %)
Number of near-endemics (Hockey <i>et. al.</i> , 2005)	27	23 (85.1 %)

Table 3.9: Expected and observed biome-restricted species (Marnewick *et al.*, 2015) on the study area.

Species	Kalahari-Highveld	Nama-Karoo	Observed/Expected
Kalahari Scrub-robin (<i>Erythropygia coryphaeus</i>)	X		Observed
Sociable Weaver (<i>Philetairus socius</i>)	X		Observed
Ludwig's Bustard (<i>Neotis ludwigii</i>)		X	Observed
Karoo Korhaan (<i>Eupodotis vigorsii</i>)		X	Observed
Karoo Chat (<i>Emarginata schlegelii</i>)		X	Expected
Karoo Long-billed Lark (<i>Certhilauda subcoronata</i>)		X	Observed
Red Lark (<i>Certhilauda burra</i>)		X	Observed
Sclater's Lark (<i>Spizocorys sclateri</i>)			Observed
Stark's Lark (<i>Spizocorys starki</i>)			Observed
Black-eared Sparrow-Lark (<i>Eremopterix australis</i>)			Observed
Sickle-winged Chat (<i>Emarginata sinuata</i>)		X	Observed
Tractrac Chat (<i>Emarginata tractrac</i>)		X	Expected
Pale-winged Starling (<i>Onychognathus nabourop</i>)		X	Observed
Namaqua Warbler (<i>Phragmacia substriata</i>)		X	Expected

3.3.9.1. Bird species of Conservation Concern

An overview of bird species of conservation concern that could occur on the study area based on their historical distribution ranges and the presence of suitable habitat is provided in Table 3.10. According to Table 3.10, a total of eight species could occur in the study area including three globally threatened species, one globally near-threatened species, five regionally threatened species and three regionally Near-threatened species. Noteworthy species observed in the study area include the Endangered Ludwig's Bustard

Neotis ludwigii, the Vulnerable Martial Eagle *Polemaetus bellicosus*, the Vulnerable Red Lark *Certhilauda burra*, the Near Threatened Karoo Korhaan *Eupodotis vigorsii* and the Near threatened Sclater's Lark *Spizocorys sclateri*.

Both the Vulnerable Lanner Falcon *Falco biarmicus* and Burchell's Courser *Cursorius rufus* were not observed during the surveys, but have both a high probability to occur based on the presence of suitable habitat.

Most of these species (especially the bustards, korhaans and larks) occupy large home ranges consisting of open habitat or open sparsely vegetated gravel plains. Therefore, extensive and lightly vegetated shrubveld plains provide optimal habitat for many of these terrestrial bird species.

Table 3.10: Bird species of conservation concern that could utilise the study area based on their historical distribution range and the presence of suitable habitat. Red list categories according to the IUCN (2015)* and Taylor (in press)**

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: SABAP1 (n=23)	Mean Reporting rate: SABAP2 (n=3)	Preferred Habitat	Potential Likelihood of Occurrence
<i>Ardeotis kori</i> (Kori Bustard)	Near-threatened	Near-threatened	20	100	Arid open lowland savanna and karroid shrub.	Low, regarded as a rare on the study area.
<i>Cursorius rufus</i> (Burchell's Courser)	-	Vulnerable	8	100	Open sparsely vegetated plains and stony gravelly semi-desert.	High, regarded as resident on gravel plains.
<i>Eupodotis vigorsii</i> (Karoo Korhaan)	-	Near-threatened	25.5	-	Low shrubland and open grassy plains.	High and resident on the study site.
<i>Falco biarmicus</i> (Lanner Falcon)	-	Vulnerable	15	-	Varied, but prefers to breed in mountainous areas.	An occasional foraging visitor to the study area.
<i>Neotis ludwigii</i> (Ludwig's Bustard)	Endangered	Endangered	-	100	Arid savanna and open karroid shrub.	High, regarded as a resident on the study area, especially on calcrete plains.
<i>Polemaetus bellicosus</i> (Martial Eagle)	Vulnerable	Endangered	30	-	Varied, from open karroid shrub to lowland savanna.	Regarded as a regular foraging visitor. Breeding status uncertain.

Species	Global Conservation Status*	National Conservation Status**	Mean Reporting rate: SABAP1 (n=23)	Mean Reporting rate: SABAP2 (n=3)	Preferred Habitat	Potential Likelihood of Occurrence
<i>Certhilauda burra</i> (Red Lark)	Vulnerable	Vulnerable	-	-	Shale or alluvial plains or red sand dunes	A highly localised resident.
<i>Spizocorys sclateri</i> (Sclater's Lark)		Near-threatened	-	-	Stony to arid gravel plains, especially on quartz gravel.	A fairly common resident on the study area.

3.3.10. Protected Areas

The Boven Solar PV4 site does not fall within any protected areas defined in the National Protected Expansion Strategy (NPAES) or South African National Parks (NBA). There are no formal protected areas within 20 km of the sites. The closest NPAESs are the Gariep NPAES, located approximately 67 km south-east of the sites and the Kamiesberg Bushmanland Augrabies NPAES located approximately 105 km north-west of the sites. The Augrabies Falls National Park is 106 km north-west of the site.

3.4. Heritage Profile

3.4.1.1. Palaeontology

The entire area is underlain at depth by a variety of Precambrian basement rocks (c. 2 billion years old) assigned to the Namaqua-Natal Province. These ancient igneous and high-grade metamorphic rocks (mainly granites and gneisses) crop out at surface as small patches and are entirely unfossiliferous. The Precambrian crustal rocks are transected by a major NW-SE trending fault zone, the Boven Rugzeer Shear Zone. A large proportion (probably over 50 %) of the basement rocks are mantled by a range of superficial sediments of Late Caenozoic age, some of which are included within the Kalahari Group. These predominantly thin, unconsolidated deposits include small patches of calcretes (soil limestones), gravelly to sandy river alluvium, pan sediments along certain watercourses, surface gravels, colluvium (scree) as well as wind-blown sands of the Gordonia Formation. Most of these younger rock units are of widespread occurrence and low palaeontological sensitivity. Scientifically important vertebrate fossil remains (e.g. Pleistocene mammalian bones and teeth) have been recorded within older stratified pan and river sediments in the Bushmanland region where they are often associated with stone artefacts, while a limited range of trace fossils (e.g. plant root casts, termitaria and other invertebrate burrows) may be found within calcrete horizons.

3.4.1.2. Archaeology

Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont 1995). Such material is referred to as 'background scatter' and is invariably of very limited significance. At times, however, the scatter can become very dense and mitigation work is occasionally called for. The artefacts located in these contexts are largely Early Stone Age (ESA) and Middle Stone Age (MSA) and are not associated with any other archaeological materials – these would have long since decomposed and disappeared. Previous experience in the area suggests that such dense accumulations of artefacts are unlikely to occur in this area.

Of potentially more significance, however, are Later Stone Age (LSA) sites which are commonly located along the margins of water features in Bushmanland. These features include both pans and ephemeral drainage lines. Such sites were identified in the vicinity of the present study area in association with pans but artefact scatters associated with drainage lines were rare (Orton 2014a, 2014b, 2014c). The previous assessments found only one site of any significance associated with a pan – this site is not implicated in the present proposals. Nevertheless, LSA camp sites could still be revealed. These sites would typically contain mostly stone artefacts, but fragments of ostrich eggshell (used as water containers and also as a food source) and pottery are also found at times, while bone is rare and likely confined to sites that are very recent. Despite the increased likelihood of locating archaeology along streams, Morris (2009) noted that a search along the banks of the Hartebeest River close to Kenhardt, where he expected elevated frequencies of archaeological material, also revealed virtually nothing. Similar LSA sites can also be found in association with rocky outcrops. Because of their positions along water courses and adjacent to rocky areas, such sites are often avoided by development proposals because of the need to avoid the relevant natural features.

Another kind of archaeological site fairly commonly encountered in Bushmanland is small rock outcrops that have been quarried as a source of stone material for making stone tools. Several such occurrences were noted to the east where quartz outcrops were frequently flaked (Orton 2014a, 2014b, 2014c) but these are not archaeologically significant.

A field survey of the preferred site and the transmission corridor revealed archaeological material to be very thinly scattered throughout but several sites with low-medium heritage significance were located alongside a pan in the north-western part of the preferred development site and on a rocky koppie along the transmission corridor. These sites are mostly stone artefact scatters, although some had ostrich eggshell fragments associated with them and some (at the koppie) had low stone structures. One stone pile may have been a grave. The site in the PV area could potentially be destroyed through construction of the proposed facility, but those on the koppie are unlikely to be affected. The archaeological sites should be avoided with a buffer of at least 20 m, but, to protect some of the context of the sites, buffers of 75 m from the centre of the pan and 120 m from the summit of the koppie are preferred. Excavation, if required, would be by a professional archaeologist under a permit issued to the archaeologist by the SAHRA. The possible grave is considered to be of high heritage significance. It should be avoided with a buffer of at least 5 m (or included within the koppie buffer) but if this is not possible then it should be tested under a permit issued to the archaeologist and, if human remains are found, it would require exhumation. If the site was found to not contain a burial then it would have no heritage significance.

The built environment is sparsely represented in Bushmanland because the farms tend to be so large. The vast majority of structures appears to be quite recent in age (20th century) and is of very limited heritage significance. In any case, the development will not affect any buildings. Graves are also very rare. Some older farms may have small graveyards located close to their farm buildings but, again, these are highly unlikely to be included within the areas proposed for development. Unmarked pre-colonial graves can, in theory, be located anywhere, although they are generally more common in sandy areas where excavation of graves was easier and in more productive areas where population densities would have been higher. It is highly unlikely that pre-colonial graves would be encountered in the study area.

Although the Anglo-Boer War was fought across the Northern Cape, there is little of significance in the Kenhardt area. The town was occupied by the Boers early on 25th February 1900 but they surrendered to the British who occupied the town on 31st March 1900 (Grobler 2004).

3.4.2. Cultural landscape

The proposed Boven Solar PV4 site is in a remote and sparsely populated region with the nearest town, Kenhardt, approximately 30 km north east of the site. Sheep farming is the major agricultural activity and the site is located on sheep farming land. The Sishen-Saldanha iron ore railway line traverses the property

on which the facility will be built, and passes within 5 km of the proposed solar facilities. The railway line was recently renovated. The Nieuwehoop Substation is currently being constructed on the Gemsbok Bult Farm (Remaining Extent of Portion 3 of Farm No. 120). The R27, a major road between Cape Town and Upington, is approximately 14 km west of the proposed site. The road is relatively busy and tourists visiting towns along the Orange River valley form part of its users. A secondary road, R383, connecting Kenhardt with Marydale passes the site. Several communication towers are visible in the landscape. There are several buildings within 10 km of the proposed development and it is possible that existing views from these may be affected by the development (Holland, 2014).

The cultural landscape is very poorly developed in this area with fences, water troughs and wind pumps being the primary features. The natural landscape lacks visually interesting and sensitive features.

The proposed site is a long distance from any important roads (e.g. more than 10 km from the R27) and is highly unlikely to be visible to anyone other than local residents making use of the gravel road along the railway line.

The cultural landscape is of low value and because of the Sishen-Saldanha Railway and Eskom Nieuwehoop Substation that are currently being constructed on the Remaining Extent of Portion 3 of Gemsbok Bult Farm 120. The area therefore lends itself to an industrial character to the immediate landscape (Orton, 2014).

In summary, significant impacts to heritage resources are likely to be limited to archaeological resources, but at the same time such resources may be easily avoided by the final layouts. Surface archaeological sites in Bushmanland tend to be very easy to record and sample and, as such, mitigation could be very easily effected should this be required. If dense stands of quiver trees are present it would be advisable to avoid these as they are an iconic feature of the drylands of north-western South Africa. The proposed site is suitable for development in heritage terms.

3.5. Socio-Economic Environment

3.5.1. Demographic Profile

The ZF Mgqawu District Municipality (DM) comprises six Local Municipalities namely: Mier; Kai! Garib; Khara Hais; Tsantsabane, !Kheis and Kgatelopele and is classified as a Category C municipality (Figure 3.10). The ZF Mgqawu DM covers an area of approximately 100 000 km² (almost 30 % of the Province) (ZF Mgqawu DM IDP, 2014)¹⁰ and according to the 2011 Census has approximately 236 783 inhabitants.

¹⁰ Sourced from: ZF Mgqawu District Municipality Integrated Development Plan 2015-2017 (ZF Mgqawu DM IDP, 2014)

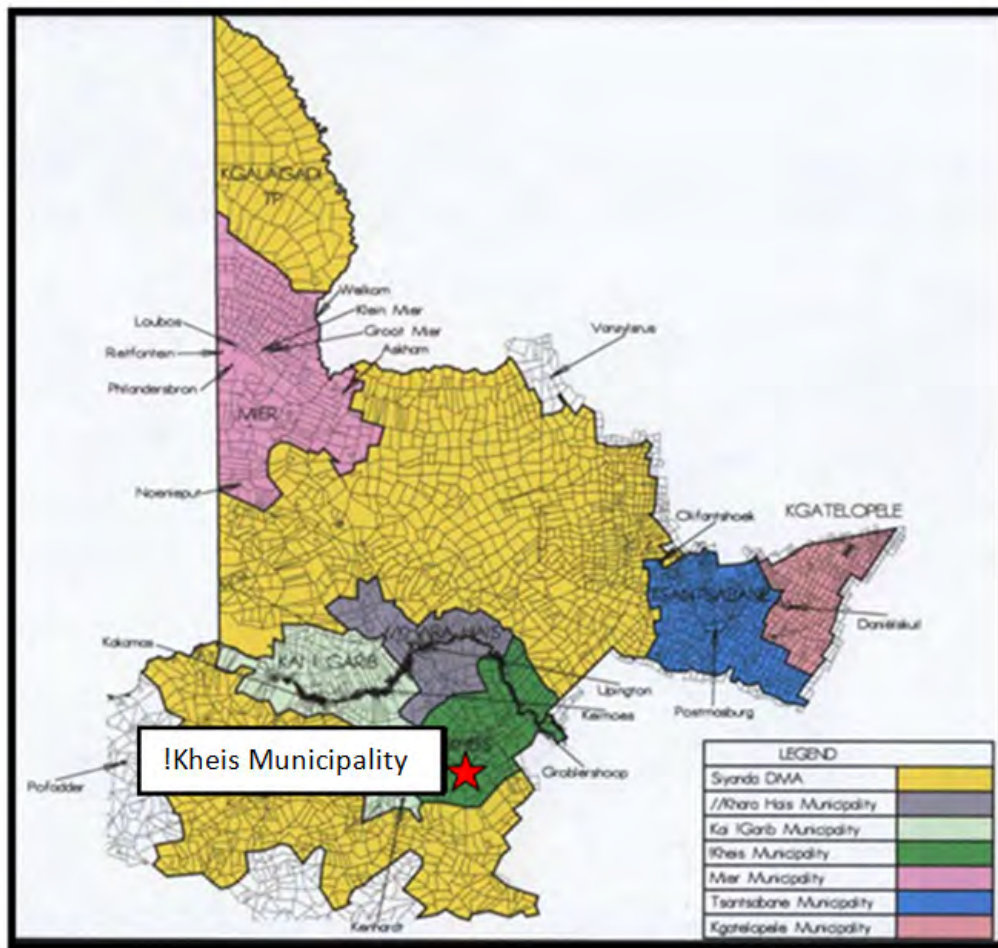


Figure 3.10: Siyanda District Municipality (now known as ZF Mgqawu DM) boundary and boundaries of local municipalities (Siyanda DM IDP, 2013)¹¹

The !Kheis Local Municipality, in which the proposed project is located, has a population of 16 637, according to the 2011 Census (Statistics SA, 2015). As shown in Table 3.11, the !Kheis Local Municipality constitutes 8% of the total population of the ZF Mgqawu DM.

¹¹ Sourced from: Siyanda District Municipality Integrated Development Plan 2013-2014 (Siyanda DM IDP, 2013)

Table 3.6: Local municipalities within the ZF Mgcawu DM and corresponding population numbers

Municipality	Census 2001	Census 2011	% of the total population	Difference	Area (Km ²)	Persons / Km ²
Mier	7207	7003	3%	493	22468	0.3
Kai Garib	58 617	65 869	24%	799	26357	2.1
//Khara Hais	77 919	93 494	42%	25249	21780	4.6
!Kheis	16 538	16 637	8%	2797	11107	1.7
Tsatsabane	27 082	35 093	12%	4018	18330	1.5
Kgatelopele	14 743	18 687	9%	6755	2478	8.7
Total	202 106	236 783	100%	35903	102520	2.3

Afrikaans is the dominant language (76.4 %) and Setswana the second largest language (15.8 %) spoken in the ZF Mgcawu DM. Within the !Kheis Local Municipality 94 % of the population speaks Afrikaans and 1.9 % Setswana. The population of the ZF Mgcawu DM is predominantly Coloured (61.2 %), followed by Black Africans (29.8 %) and Whites (8.3 %), with the !Kheis Municipality containing a similar racial population group composition (as shown in Figure 3.11).

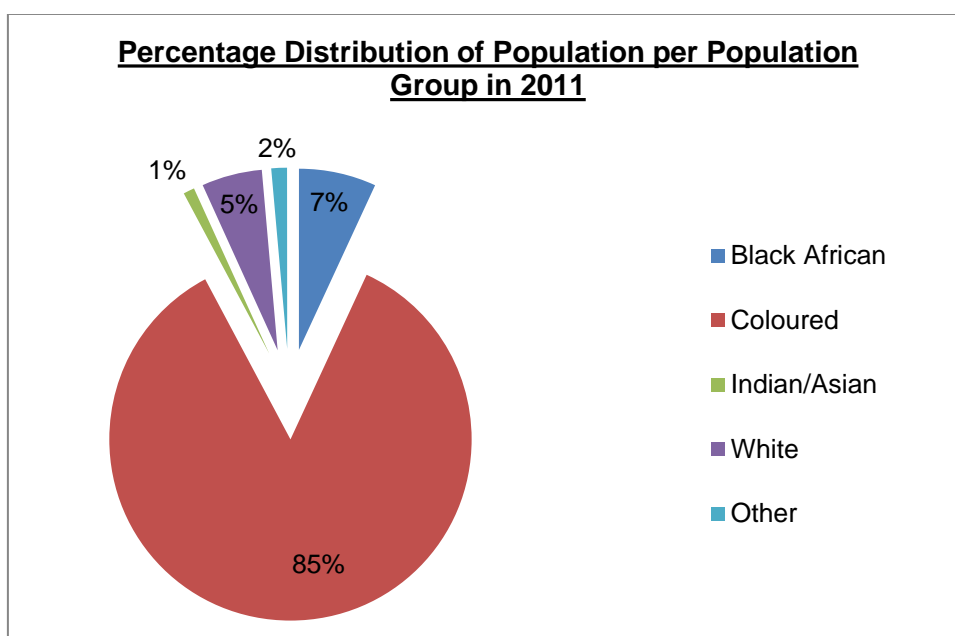


Figure 3.8: Percentage Distribution of Population per Population Group for the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015)

The age distribution of the ZF Mgcawu DM (shown in Figure 3.12 below) is represented by a majority of young people, i.e. persons younger than 40 years old (Census, 2011)¹².

¹² Sourced from: Census 2011 Municipal report, Northern Cape, Report 03-01-51 (Census, 2011)

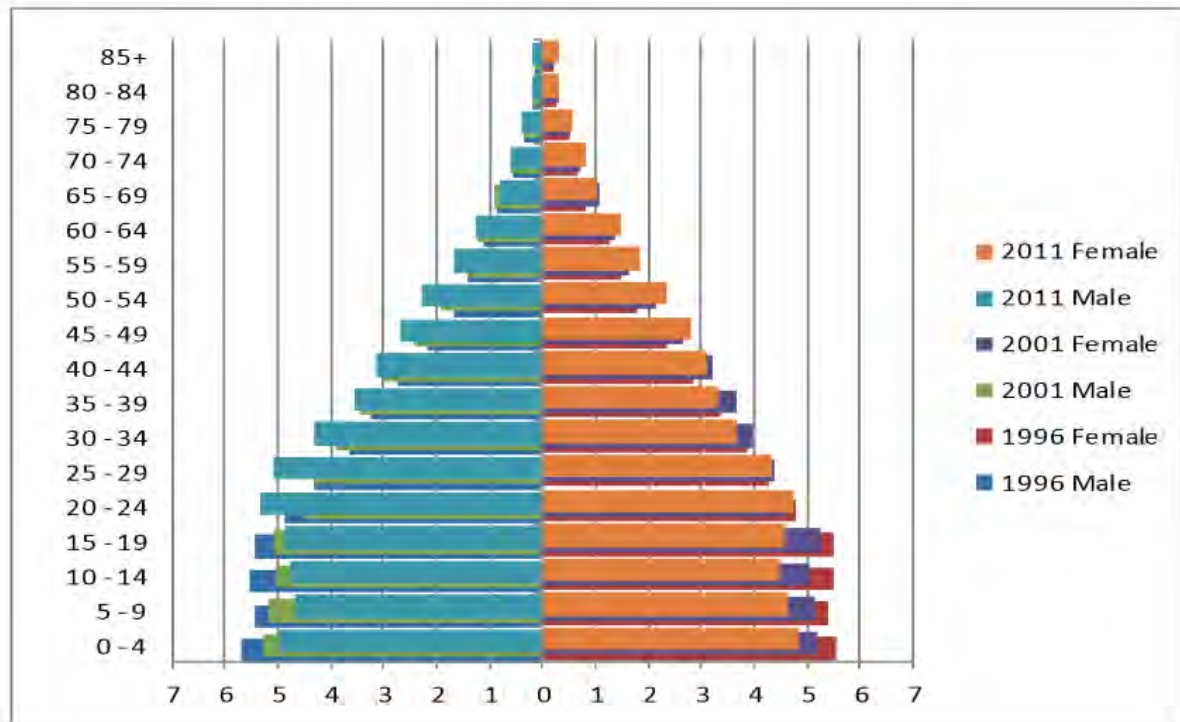


Figure 3.9: Age distribution of the ZF Mgcawu DM (Statistics South Africa, 2011)

3.5.2. Economic Profile

The Northern Cape Province has the third highest per capita income of all nine Provinces; however, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. Approximately 60 % of ZF Mgcawu DM's population has an income of between R 0 to R 800 per month. Approximately 7.7% of the population of the !Kheis Local Municipality has no income, whereas the majority of the population (i.e. 28.30 %) earns between the R 19 601 – R 38 200 income bracket, as shown in Figure 3.13 below.

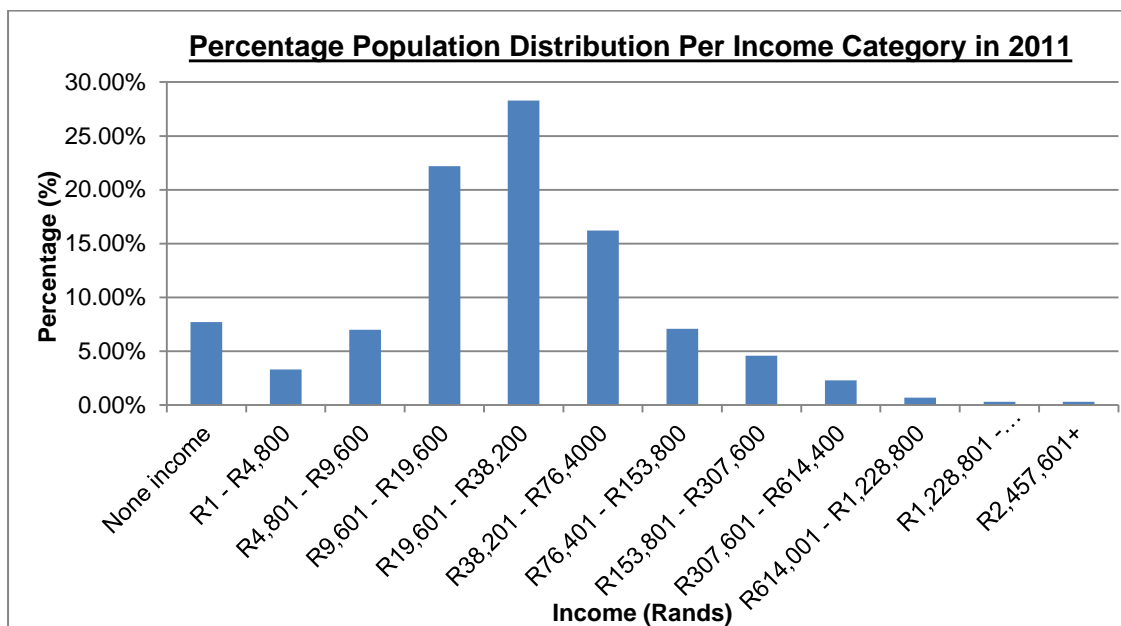


Figure 3.10: Income Distribution of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015)

The 2011 census indicates that 22 % and 34 % of the economically active population (between the ages of 15-34) in the ZF Mgcawu DM and the !Kheis Local Municipality, respectively, are unemployed. The !Kheis Local Municipality has the highest unemployment percentage of all the local municipalities falling within the ZF Mgcawu DM. Also, nearly a third of the population is economically inactive which suggests that individual and household incomes generated in the study area are being used to support a substantial amount of dependents. This in turn exacerbates the level of household vulnerability in the area.

The unemployment rate for the !Kheis Local Municipality in 2001 was 20 % and in 2011 was 28 % (Statistics SA, 2015). The official unemployment rate of 10 % (based on the 2011 Census) has decreased by 6.1 % since the 2001 Census measurement of 16.1 % for the Kai !Garib Local Municipality. The economic sector is dominated by agriculture which provides 51.8 % of jobs, followed by the Community and Government Services sector with 15.9 %. The number of jobs generated by the agricultural sector needs to be interpreted within the context of the Kai !Garib Municipality. The vast majority of the land area occupied by the Kai !Garib Municipality consists of agricultural land, accordingly, it is unsurprising that agriculture would register as the major employer at municipal (i.e. regional) level.

However, the distribution of jobs within urban centers, like Kenhardt, does not necessarily follow this agriculturally dominated pattern. If the prevailing practice of predominantly male-oriented employment within the agricultural sector (specifically in terms of sheep farming) is assumed, the 51.8 % of jobs generated by the agricultural sector could in fact be heavily skewed towards men. This in turn is suggestive of a female dominated population which is heavily dependent on other economic sectors (i.e. non-agricultural sectors) for their income, and could very well imply that socio-economic impacts on urban centers, like Kenhardt, could be of more significance than farm-based impacts.

In terms of education, 9.5 % of the total population of ZF Mgcawu DM has no formal schooling, while 13.5 % of the !Kheis Local Municipality's population is unschooled. Based on the 2011 Census, 3.1 % of the population of the !Kheis Local Municipality has no form of education, 55 % has some primary schooling, 7.5 % completed primary school, 5.7 % completed secondary school and 0.5 % has higher education, as shown in Figure 3.14 below.

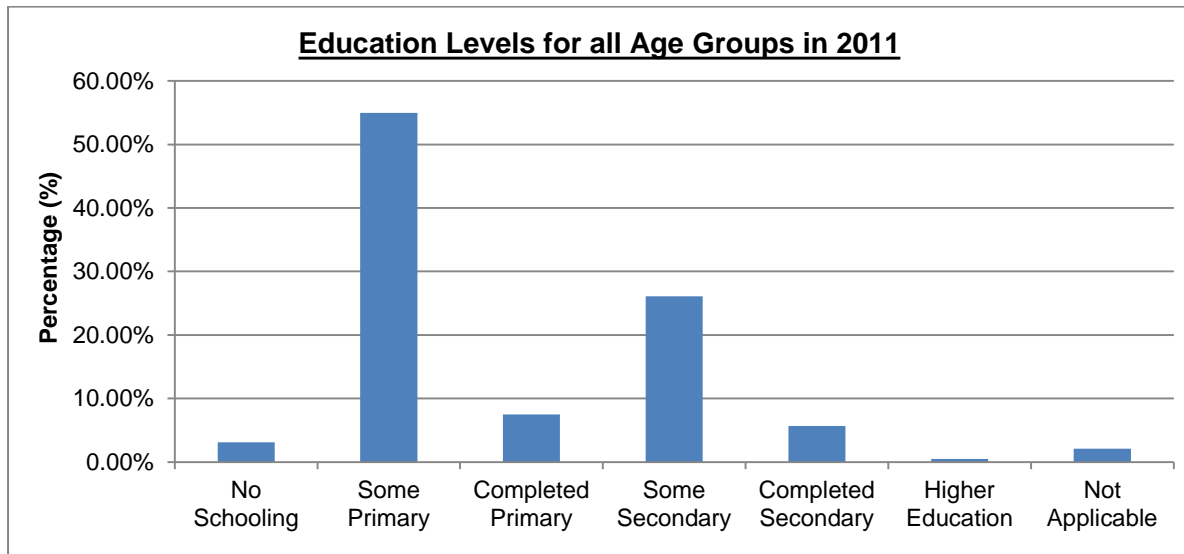


Figure 3.11: Education Levels of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015)

The economy of the ZF Mgcawu DM is dominated by mining and agriculture and accounts for up to 30 % of the Northern Cape's economy. Agriculture is the major industry in the district, contributing to job creation and economic growth. The region is characterised by livestock farming which occurs mainly on large farms that are managed for extensive production. The majority of these farms are privately owned. According to the !Kheis Local Municipality's IDP, the area is ideal for stock-farming, with the main focus being on sheep farming. The stock-farming industry also provides work to local people.

The ZF Mgcawu DM has a unique landscape that has the potential to contribute to and provide for a range of local and international tourist activities and destinations. The main attractions and destinations in the area are the Augrabies Falls National Park and the Kgalagadi Transfrontier Park. The presence of the Orange River is also a tourism asset providing several tourism opportunities. The natural appearance of the area also supports agricultural tourism.

The IDP of the ZF Mgcawu DM indicates that tourism is one of the most important economic sectors in the Northern Cape as well as within the ZF Mgcawu DM boundaries. Tourism is a growing component of the economy of the Northern Cape and the IDP indicates that, after the agricultural sector, the local tourism industry should become the most important economic activity in the area within the next ten years. This is based on the current growth rate in both development and employment.



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 4:

Approach to EIA Process
and Public Participation

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4. APPROACH TO EIA PROCESS AND PUBLIC PARTICIPATION

This chapter presents the approach to the impact assessment phase of the EIA Process, for the proposed development 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 GN R982), the schedule for the EIA Process, and the Terms of Reference (TOR) for the specialist studies that have been undertaken. 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 finalised Scoping Report for this project (CSIR, 2015).

The purpose of the EIA Phase is to:

- Address issues that have been identified through the Scoping Process;
- Assess all identified impacts and determine the significance of each impact; and
- Recommend actions or mitigation measures to avoid/mitigate negative impacts and enhance benefits.

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 DEA and other commenting authorities (Sections 4.1, 4.4, and 4.6);
- Undertaking of a PPP whereby findings of the EIA Phase are communicated and discussed with I&APs and responses are documented (Section 4.4); and
- Undertaking of specialist studies that provide additional information/assessments required to address the issues raised in the Scoping Phase (Sections 4.8 and 4.9).

The EIA Process is a planning, design and decision making tool used to demonstrate to the responsible authority, DEA, and the project proponent, Boven PV4 (Pty) Ltd, what the consequences of their choices will be on the biophysical, social and economic aspects of the environment. 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.

4.1. Legal Context for this EIA

Section 24(1) of the NEMA states:

- *"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 environmental authorization."*

The reference to "listed activities" in Section 24 of the NEMA relates to the regulations promulgated in GN R982, R983, R984 and R985 in Government Gazette 38282, dated 4 December 2014, which came into effect on 8 December 2014. The relevant Government Notices published in terms of the NEMA collectively comprise the NEMA EIA Regulations listed activities that require either a Basic Assessment, or Scoping and EIA (that is a "full EIA") be conducted. As noted in Chapter 1 of this EIA Report, the proposed

project requires a full EIA, as it particularly includes, *inter alia*, the inclusion of Listed Activity Number 1 in GN R984:

- *“The development of facility 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 within an urban area”.*

All the listed activities potentially 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 DEA. The letter of acknowledgement from the DEA is included in Appendix G to the EIA Report. The EIA Report is hereby submitted to the DEA for decision-making (in accordance with Regulation 21 (1) of the 2014 EIA Regulations). The listed activities potentially triggered by the proposed project are indicated in Table 4.1.

As noted in Chapter 1 of this EIA Report, the DEA accepted the finalised Scoping Report and Plan of Study for EIA in a letter dated 29 January 2016 (as shown in Appendix G of this EIA Report). As part of the acceptance of the finalised Scoping Report and Plan of Study for EIA, the DEA requested some clarification in terms of certain the listed activities included in the Application for EA and the finalised Scoping Report (as shown in Appendix G of this EIA Report). Table 4.1 shows the requirements from the DEA in terms of the applicable listed activities, as well as the corresponding responses from the EAP.

Table 4.1: Comments from DEA regarding Listed Activities in GN R982 and GN R983 that potentially form part of the proposed Boven Solar PV4 project

DEA Requirement (as noted in the Letter of Acceptance of the Scoping Report and Plan of Study for EIA dated 29 January 2016 (refer to points (i); (ii) and (iv)))	CSIR Response
<p>(i) (GN R. 983 Item 12:</p> <p>“The development of – (x) buildings exceeding 100 square metres in size; (xii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>Where such development occurs- (a) within a watercourse (b) in front of a development setback; or (c) if no development setback exists, within 32 m of a watercourse, measured from the edge of a watercourses.”</p> <p>The Environmental Assessment Practitioner must apply for the specific aspect of the activity, i.e. either part (a) or part (b) etc. as all of these parts of the activity cannot be authorised.</p>	<p>Part (c) is applicable to the project as some of the powerline poles or foundations may be constructed within 32 m from a watercourse.</p> <p>The application form will be amended by omitting Parts (a) and (b) of this relevant activity, i.e. GN R. 983 Item 12.</p>
<p>GN R. 983 Item 19:</p> <p>“The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water of the sea or an</p>	<p>Part (i) indicating a watercourse is applicable to the project. Parts (ii) and (iii) are not applicable as the project will not be developed in the coastal zone or off-shore.</p> <p>The application form will be amended by omitting Parts (ii) and (iii) of this relevant activity, i.e. GN R. 983 Item 19.</p>

DEA Requirement (as noted in the Letter of Acceptance of the Scoping Report and Plan of Study for EIA dated 29 January 2016 (refer to points (i); (ii) and (iv)))	CSIR Response
<p>estuary whichever distance is the greater.”</p> <p>The Environmental Assessment Practitioner must apply for the specific aspect of the activity, i.e. either part (i) or part (ii) etc. as all of these parts of the activity cannot be authorised</p>	
<p>GN R. 983 Item 24:</p> <p>“The development of-</p> <p>(ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.”</p> <p>The Environmental Assessment Practitioner must apply for the specific aspect of the activity, i.e. either a road with a reserve wider than 13, 5 meters, or where no reserve exists as all of these parts of the activity cannot be authorised.</p>	<p>Please note this activity no longer applies.</p> <p>Should the Transnet Service Road not be used for access to the preferred site, then the unnamed farm gravel road will be used and widened to approximately 6 m. Internal roads within the PV plant will be constructed within the project footprint which will be 6 m. This is below the 8 m threshold and this activity therefore does not apply.</p> <p>Please note the application form will be updated to exclude this activity and will be submitted to DEA with the finalised version of the EIA Report for decision-making.</p>
<p>ii. The EIAR must include the following:</p> <p>GN R.983 Item 19:</p> <p>With regards to infilling and excavation of watercourses for the construction of the PV Solar Energy facility, this Department requires the applicant to provide an indication of the preferred and alternate locations from which the material used for infilling will be sourced and where excavated material will be stored and/or disposed of. In addition, the impacts associated with this activity must be adequately assessed in the EIAR.</p>	<p>The area’s marked as the roads, substation and laydown areas will be cut and filled as required. Material will only be extracted or filled from these areas. The remainder of the site will be left to follow the natural topography. Material will not be sourced from other areas and will not be stored on site.</p>
<p>v. It is imperative that the relevant authorities are continuously involved throughout the EIAR process as the development property possibly falls within geographically designated areas in terms of all activities under GN R.985. Written comments must be obtained and submitted to this Department. In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.</p>	<p>The application form which was submitted to DEA includes listed activity 12 (d) under GN R.985. It was initially thought that the development possibly falls within a geographically designated area in terms of GN R.985. However, the proposed project does not trigger any listed activities within GN R985. This was confirmed in the Ecological Impact Assessment (Chapter 8 of this EIA Report). Overall, the proposed project site is not located within any protected areas, or within 5 km of a protected area, or within 10 km of a World Heritage site. Furthermore, the proposed project site does not fall within a Critical Biodiversity Area or within any expansion area in terms of a conservation strategy for the Northern Cape.</p>

The DEA also requested, as part of the acceptance of the finalised Scoping Report, that the EIA Report must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for, and that the listed activities represented in the EIA Report and Application for EA must be the

same and correct. The relevant listed activities as indicated in Table 4.1 (i.e. GN. R. 983 Items 12, 19 and 24) will be amended in the Application Form to ensure that the listed activities in the Application Form and the EIA Report are the same. In addition two additional listed activities have been included in the Amended Application Form and EIA Report, i.e. 9 (i) and (ii); and 10 (i) and (ii) of GN R983. These activities as well as the other listed activities that are triggered by the proposed project are indicated in Table 4.2. Table 4.2 also shows the sections in the EIA Report where the triggered listed activity is assessed.

Table 4.2: Listed Activities in GN R983 and GN R984 that potentially form part of the proposed Solar Photovoltaic Facility near Kenhardt in the Northern Cape

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
GN R983			
Activity 9 (i) and (ii)	<p>The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water:</p> <p>(i) with an internal diameter of 0,36 metres or more; or</p> <p>(ii) with a peak throughput of 120 litres per second or more;</p> <p>excluding where:</p> <p>a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or</p> <p>b) where such development will occur within an urban area.</p>	<p>The proposed solar PV facility will be constructed on the Remaining Extent of Boven Rugzeer Farm, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !kheis Local Municipality, Northern Cape Province. Hence the proposed project will take place outside of an urban area.</p> <p>The proposed project will entail the construction of stormwater channels. These structures will extend approximately 3000 m in length (i.e. will exceed 1000 m), will have an internal diameter of more than 0.36 m, and a peak throughput of more than 120 l/s.</p>	<p>The impact of the construction and operation of the proposed project (inclusive of all infrastructural components) is assessed in the specialist studies, as included in Chapters 7 to 14 of this EIA Report. For example, the Faunal Impact Assessment (Chapter 10) assesses the potential impact of the alteration of habitat change and associated change to local community composition due to the development of the proposed PV facility. This operational phase direct impact is rated with a low significance, with the implementation of mitigation measures. The Visual, Heritage, Palaeontology, Soils and Socio-Economic Impact Assessment specialist studies also provide additional impact assessments relating to the construction and operation of the proposed facility.</p>
Activity 10 (i) and (ii)	<p>The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes:</p> <p>(i) with an internal diameter of 0,36 metres or more; or</p> <p>(ii) with a peak throughput of 120 litres per second or more;</p>	<p>The proposed project will entail the construction of drainage structures (i.e. French drains) for the transfer of waste water generated by the proposed facility. These structures may exceed 1 000 m in length, may have an internal diameter of 0.36 m or more, and possibly a peak throughput of 120 l/s or more.</p> <p>As previously noted, the proposed solar PV facility will be constructed on the Remaining Extent of Boven Rugzeer Farm 169, approximately 80 km south of</p>	<p>The impact of the construction and operation of the proposed project (inclusive of all infrastructural components) is assessed in the specialist studies, as included in Chapters 7 to 14 of this EIA Report. The Ecology, Visual, Heritage, Palaeontology, Soils and Socio-Economic Impact Assessment specialist studies also provide additional impact assessments relating to the construction and operation of the proposed facility.</p>

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
	<p>excluding where -</p> <p>a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or</p> <p>b) where such development will occur within an urban area.</p>	<p>Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province. Hence the proposed project will take place outside of an urban area.</p>	
Activity 11 (i)	<p>The development of facility 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 (kv).</p>	<p>The proposed project will entail the construction and installation of an overhead 132 kV transmission line. The connection point to the substation will take place on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt in the Northern Cape Province, outside an urban area.</p>	<p>The construction of the proposed transmission line and associated electrical infrastructure at the Eskom Nieuwehoop Substation has been - assessed in specialist studies (Chapter 7-14 of this EIA Report).</p>
Activity 12 (x) and (xii)	<p>The development of:</p> <p>(x) buildings exceeding 100 square metres in size;</p> <p>(xii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>where such development occurs-</p> <p>a)</p> <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</p>	<p>The proposed solar PV facility will be constructed on Remaining Extent of Boven Rugzeer Farm 169, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape. Hence the proposed project will take place outside of an urban area.</p> <p>The proposed Solar PV Facility will entail the construction of building infrastructure and structures (such as the solar field, offices, workshops, ablution facilities, on-site substations, laydown areas and security enclosures etc). Based on the sensitivity screening undertaken for the site, two rivers flow through the farm (as shown in Chapter 3 of this EIA Report) and the buildings and infrastructure are expected to exceed a footprint of 100 m² and some are likely to occur within 32 m of the watercourses (i.e.</p>	<p>As noted in the Ecological Impact Assessment (Chapter 8 of this EIA Report), a buffer of 32 m has been applied from major drainage features where it intersects with the project area. The applicant has optimised the site layout by excluding these 32 m buffers from the development of the solar farm.</p> <p>Other minor drainage features are noted within the subject site. The Ecological Impact Assessment (Chapter 8 of this EIA Report) also explains that minor drainage lines require a buffer zone, but the buffer zone can possibly be decreased to a 20m. The impact of construction buildings, structures and infrastructure associated within the Boven PV4 area are assessed in the Ecological Impact Assessment</p>

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
	<p>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; or</p> <p>(ee) where such development occurs within existing roads or road reserves.</p>	<p>within 20 m from the minor drainage lines). It is estimated that the total area required for the proposed building structures (including associated infrastructure and roads) is 25 ha.</p> <p>This has been confirmed in the Ecological Impact Assessment specialist study (included in Chapter 8 of this EIA Report), The Ecological Impact Assessment has recommended a 32 m buffer around the major drainage lines within the Boven PV4 area. No construction will occur within 32 m of the major drainage lines as recommended in the Ecological Impact Assessment. However, the assessment also identified various minor drainage lines that occur within the Boven PV4 area which need to be avoided by 20 m.</p>	<p>(Chapter 8 of this EIA Report).</p> <p>The powerline routing will traverse within 32 m from a watercourse. The applicant will ensure that the powerline foundations are not constructed within 32 m of the watercourse.</p>
Activity 19 (i)	<p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from –</p> <p>(i) 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; or</p> <p>c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.</p>	<p>The proposed project may entail the excavation, removal and moving of more than 5 m³ of soil, sand, pebbles or rock from the nearby watercourses. The proposed project may also entail the infilling of more than 5 m³ of material into the nearby watercourses. The Ecological Assessment undertaken (Chapter 8 of this EIA Report) has identified two rivers which flow through the farm Construction of the internal gravel access road and/or the construction of infrastructure within drainage lines may require the removal of material.</p> <p>The Ecological Impact Assessment has recommended a 32 m buffer around the major drainage lines within the project area. No construction will occur within 32 m of the major drainage lines as recommended in the Ecological Impact Assessment. However, the assessment also identified various minor drainage lines that occur</p>	<p>The impact of the proposed Boven PV4 solar facility is assessed in the Ecological Impact Assessment (Chapter 8 of this EIA Report).</p>

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
		on site. A buffer of 20 m from these minor drainage lines are proposed by the specialist. Therefore, construction of the internal gravel roads and/or the construction of infrastructure within the minor drainage lines may require the removal of material from or the infilling of material into the minor drainage lines.	
Activity 24 (ii)	The development of – (ii) a road which is wider than 8 metres; but excluding – a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or b) roads where the entire road falls within an urban area.	The existing Transnet Service Road or an unnamed farm road will be used to gain access to the preferred site. The Transnet Service Road can be accessed from the R27 via the R27 National Road. The unnamed farm road can be accessed via the R383. An internal gravel road may be constructed from the Transnet Service Road or the unnamed farm road to the proposed project site. The internal gravel road would be less than 8 m (without a road reserve). The length of the internal gravel road is 10 km. The proposed solar PV facility will be constructed on the Remaining Extent of Boven Rugzeer Farm 169, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape. Hence the proposed project will take place outside of an urban area.	As the internal road will be 6 m wide and not wider than 8 m this activity is excluded from the amended application form as it no longer applies
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;	The proposed solar PV facility will be constructed on the Remaining Extent of Boven Rugzeer Farm 169, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape. It is understood that the land is currently used for agricultural purposes (mainly grazing). The proposed 75 MW solar PV facility which is considered to be a commercial/industrial development,	The impact of the footprint of the proposed PV facility is assessed in the specialist studies, as included in Chapters 7 to 14 of this EIA Report. The Soils and Agricultural Potential Assessment (included in Chapter 11 of the EIA Report) also addresses the current use of the land and its potential for agricultural use.

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
	<p>excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	<p>will comprise an area of approximately 220 ha.</p> <p>It should be noted that the total surface area to be covered (including buildings, solar panels, on-site substation, associated infrastructure and roads) is approximately 25 ha.</p> <p>Building infrastructure:</p> <ul style="list-style-type: none"> • Offices: 30 m² • Operational and Maintenance Control centre: 50 m² • Ablution facilities: 10 m² • Inverter stations: 4 x 10 m • On-site substation: 100 m² • Guard cabin: 10 m² • Solar measuring station: 9 m² • Widening of unnamed farm road (if applicable): 6 m • Internal gravel access road: < 8 m • Solar panels: 220 ha; however less than 10 % will be actual footprint or foundations which will cover the area. <p>The electrical infrastructure components specifications triggering this activity are:</p> <ul style="list-style-type: none"> • On-site substation: 100m²; capacity: 132 kV • 132 kV overhead transmission line: Footprint area: 32 m wide and 9 km long: 15 ha • 22/33 kV internal transmission lines/underground cables 	

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
GN R984			
Activity 1	The development of facility 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 within an urban area.	The proposed project will entail the construction of a 75 MW Solar PV Facility (i.e. facility for the generation of electricity from a renewable resource). The proposed project will be constructed on the Remaining Extent of Boven Rugzeer Farm 169, approximately 80 km south of Upington and 30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape. Hence the proposed project will take place outside of an urban area.	The impact of the e proposed PV facility is assessed in the specialist studies, as included in Chapters 7 to 14 of this EIA Report.
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 total footprint of the proposed project is expected to be approximately 220 ha. Approximately 25 ha of indigenous vegetation could possibly be cleared for the construction of the proposed Solar PV Facility, which exceeds the threshold of 20 ha. The total surface area to be covered (including buildings, solar panels, on-site substation, associated infrastructure and roads) is approximately 25 ha. Building infrastructure: <ul style="list-style-type: none"> • Offices: 30 m² • Operational and Maintenance Control centre: 50 m² • Ablution facilities: 10 m² • Inverter stations: 4 x 10 m • On-site substation: 100 m² • Guard cabin: 10 m² • Solar measuring station: 9 m² • Widening of unnamed farm road (if applicable): 6 m 	The impact of the footprint of the proposed PV facility on indigenous vegetation is assessed in the Ecological Impact Assessment (Chapter 8 of the EIA Report).

Listed Activity Number	Listed Activity Description	Description of the project activity that potentially triggers the relevant listed activity	Reference to where the activity is assessed in the EIA Report
		<ul style="list-style-type: none"> • Internal gravel access road: < 8 m • Solar panels: 220 ha; however less than 10 % will be actual footprint or foundations which will cover the area. <p>The electrical infrastructure components specifications triggering this activity are:</p> <ul style="list-style-type: none"> • On-site substation: 100m²; capacity: 132 kV • 132 kV overhead transmission line: Footprint area: 32 m wide and 9 km long: 15 ha • 22/33 kV internal transmission lines/underground cables 	

Notes regarding the identification of potential listed activities:

- It should be noted that a precautionary approach was followed when identifying listed activities (for inclusion in the Application for EA and to be assessed as part of the Scoping and EIA Processes), i.e. if the activity potentially forms part of the project, it is listed. However, the final project description was shaped by the findings of the EIA Process and certain activities were added or certain parts of a specific listed activity were removed to make it more project specific. The Application Form has been revised accordingly and re-submitted to DEA.
- Based on the Ecological Assessment undertaken for the site, the proposed project area does not fall within any threatened ecosystems, National Protected Areas, National Protected Area Expansion Strategy Focus Areas or areas of conservation planning. Furthermore, there is no conservation plan for the !Kheis Local Municipality and the ZF Mgcau District Municipality, hence Critical Biodiversity Areas are not present or defined. This activity (GN R985 Activity 12 (d)) was therefore removed from the list of listed activities within the EIA Report and the Amended Application Form that has been submitted to DEA.
- It is proposed that less than 30 m³ of dangerous goods (such as petrol and diesel) will be temporarily stored on site during the construction phase. Furthermore, no infrastructure or structures are planned to be specifically constructed for the aforementioned temporary storage. Recommendations for the temporary storage of petrol and diesel on site during the construction phase were provided in the EMPr (Part B of the EIA Report).
- The relevant listed activities applicable to the construction of the proposed transmission line and associated electrical infrastructure at the Eskom Nieuwehoop Substation are included in the Application for EA and were assessed by the specialists in the EIA Process.

4.2. Legislation and Guidelines Pertinent to this EIA

The scope and content of this EIA Report have been informed by the following legislation, guidelines and information series documents. It is important to note that the specialist studies included in Chapters 7 to 14 of this EIA Report also include a description of the relevant applicable legislation.

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 proposed project is 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 project site.

4.2.1.2. NEMA and EIA Regulations published under Chapter 5 of the NEMA on 8 December 2014 (GN R982, GN R983, GN R984 and GN R985)

The NEMA sets out a number of principles (Chapter 1, Section 2) to give guidance to developers, private land owners, members of 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 a number of 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.

4.2.1.3. National Environmental Management Biodiversity Act (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (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.

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 threatened or protected species. Biodiversity offsets are a means of compensating for the loss of biodiversity after all measures to avoid, reduce or remedy biodiversity loss have been taken, but residual impacts still remain and these are predicted to be medium to high. Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the land owner/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.

An Amendment to the NEMBA has been promulgated, which lists 225 threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. Based on the preliminary sensitivity screening undertaken for the proposed site, none of the threatened ecosystems occur within the study area. This will be confirmed as part of the Ecological Impact Assessment study undertaken during the EIA Phase.

4.2.1.4. 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 managements of national heritage resources (which include landscapes and natural features of cultural significance).

Parts of sections 35(4), 36(3) (a) and 38(1) (8) 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 full Heritage Impact Assessment (including Archaeology and Cultural Landscape) and a desktop Palaeontological Impact Assessment was undertaken during the EIA Phase of the proposed project..

Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape) and the SAHRA are required to provide comment on the proposed project in order to facilitate final decision-making by the DEA. The Heritage Impact Assessment (including Archaeology and Cultural Landscape) and desktop Palaeontological Impact Assessment will be uploaded to SAHRIS for comment by the heritage authorities during the 30-day review of the EIA Report. These comments will then be addressed (where required) and included in the finalised EIA Report, for submission to the DEA for decision-making.

Once a final comment has been issued by the heritage authority, the recommendations should be included in the conditions of the EA (should it be granted). This will essentially give 'permission' from the heritage authorities to proceed. If any archaeological mitigation is required then this would need to be conducted by an appropriate specialist under a permit issued to that specialist by SAHRA. This permit has no bearing on the developer or development but is purely a way in which the heritage authority can be sure that the mitigation work will be carried out satisfactorily.

4.2.1.5. National Forests Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. According to Section 12 (1) d (read with Sections (5) 1 and 62 (2) (c)) of the National Forest Act (Act 84 of 1998), a licence is required to remove, cut, disturb, damage or destroy any of the listed protected trees. The most recent list of protected tree species was published in November 2014. The Department of Agriculture, Forestry and Fisheries (DAFF) is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. The protected trees that commonly occur in this region are *Acacia erioloba* and *Boscia albitrunca*.

4.2.1.6. The Ecological Impact Assessment (Vegetation study; Chapter 8 of this EIA Report) has considered the National Forests Act (Act 84 of 1998) when compiling the assessment. 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 land owner to control invasive alien plants occurring on the land under their control.

Should alien plant species occur within the study area; this will be managed in line with the EMPr. Rehabilitation after disturbance to agricultural land is also managed by CARA. The DAFF reviews and approves applications in terms of these Acts according to their Guidelines for the evaluation and review of applications pertaining to renewable energy on agricultural land, dated September 2011.

The Ecological Impact Assessment (Vegetation study; Chapter 8 of this EIA Report) provides a description of alien invasive vegetation likely to occur within the area, as well as recommendations for removal and management thereof.

The National DAFF (Land Use and Soil Management Directorate) have provided preliminary comment on the Scoping Report during the 30-day review period. These comments are included in Chapter 6 (Comments and Responses Trail) and Appendix G of this EIA Report.

4.2.1.7. 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, 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 ground water.

Section 21 of the Act 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 a water course or within 500 m of a wetland boundary require a Water Use Licence (WUL) under the Section 21 (c) and Section 21 (i) of the NWA. The Ecological Impact Assessment (Vegetation study, Chapter 8) indicates that a WUL will be required in respect of the proposed development under Section 21 (c) and (i) of the NWA, however such licence should not preclude the proposed development. The relevant WULs will be submitted to DWS for approval.

It is important to note that considerable efforts were made to place the proposed solar field and project infrastructure outside of wetland areas and any sensitive surface hydrological features identified by the specialists. As noted above, a 32 m buffer has been recommended around the major drainage lines within the project area. No construction will occur within 32 m of the major drainage lines as recommended in

the Ecological Impact Assessment (vegetation and avifaunal studies). As noted previously, the Boven PV4 project site includes approximately 284 ha of land, however the proposed solar facility and associated infrastructure requires a development area of approximately 220 ha only. The bigger project area therefore allows for the avoidance of major environmental constraints through the final design of the facility (i.e. the layout of the 220 ha facility has, as far as possible, been sited outside of the sensitive areas identified by the specialists) (please map in Chapter 17)

The need for a WULA will be confirmed with DWS. It is important to note that the Regional DWS has provided comment on the Scoping Report. The comments were received after the closing date of the 30-day review period and after the finalization of the Scoping Report. These comments were therefore not included in the finalized version of the Scoping Report that was submitted to DEA for decision-making. The comments from DWS are included in Chapter 6 (Comments and Responses Trail), and included in Appendix G of this EIA Report.

4.2.1.8. Astronomy Geographic Advantage (Act 21 of 2007)

The Astronomy Geographic Advantage (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;
- intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and
- matters connected therewith.

The overall purpose of the Act is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province, excluding the Sol Plaatjie Municipality, has been declared an astronomy advantage area. The South African MeerKAT radio telescope is currently being constructed about 90 km north-west of Carnarvon in the Northern Cape Province. The MeerKAT radio telescope is a precursor to the Square Kilometre Array (SKA) telescope and will be integrated into the SKA Phase 1 (SKA South Africa, 2014).

The proposed Boven Solar PV4 (PTY) LTD PV Project is located approximately 30 km north-east of Kenhardt. Kenhardt is located approximately 220 km from Carnarvon. According to the SKA Project Office, the nearest SKA station has been identified as SKA Station ID 2362, at approximately 15 km from the proposed project. The SKA office will be contacted during the duration of the EIA to confirm whether the proposed project in Kenhardt poses a risk to the SKA project. The SKA office has been pre-identified as a key stakeholder and therefore included on the project database of I&APs (as shown in Appendix C of this EIA Report). As such, the SKA office was provided with a copy of the BID, Letter 1, and Comment and Registration Form during the Project Initiation Phase. The CSIR also notified the SKA office of the release of the Scoping Report for a 30-day commenting period. Comments were received from the SKA office and are included in Chapter 6 and in Appendix G of this EIA Report. In line with the comments received, Electro Magnetic Interference (EMI) and Radio Frequency Interference (RFI) studies have been undertaken to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project. This technical report, compiled by MESA Solutions (PTY) Ltd, is included in Appendix J of this EIA Report, with a Summary of the EMI and RFI studies provided in Chapter 15.

4.2.1.9. Subdivision of Agricultural Land Act (Act 70 of 1970)

A change of land use (re-zoning) for the development on agricultural land needs to be approved in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). This is required for long term lease, even if no subdivision is required. A Soils and Agricultural Potential Assessment specialist study was undertaken and is included in Chapter 11 of this EIA Report. It assesses the impact of the proposed project on the agricultural potential of the site.

4.2.1.10. 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 facility;
- 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.

4.2.1.11. Other Applicable Legislation

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

- Electricity Act (Act 41 of 1987);
- Electricity Regulations Amendments (August 2009);
- Energy Efficiency Strategy of the Republic of South Africa (Department of Minerals and Energy (DME) now operating as Department of Mineral Resources (DMR), March, 2005);
- 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 (2010);
- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993);
- Fencing Act (Act 31 of 1963);
- National Environmental Management: Air Quality Act (Act 39 of 2004);
- National Environmental Management: Protected Areas Act (NEM:PA) (Act 31 of 2004);
- National Environmental Management: Waste Management Act (Act 59 of 2008); and the
- National Road Traffic Act (Act 93 of 1996).

4.2.2. Provincial Legislation

4.2.2.1. Northern Cape Nature Conservation (Act 09 of 2009)

The Northern Cape Nature Conservation Act (Act 09 of, 2009) and in particular the Northern Cape Conservation: Schedule 2 – Specially Protected Species 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 follow:

- 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 regard to protected flora, the Northern Cape Nature Conservation Act includes a list of protected flora. The plant species potentially present within the proposed project area have been identified as part of the Ecological Impact Assessment specialist study (Chapter 8 of this EIA Report). The Ecological Impact Assessment provides a list of species identified on site and the conservation significance in terms of the Northern Cape Nature Conservation Act (Act 09 of 2009). However, it has been recommended as part of the EMPr, that a detailed plant search and rescue operation be conducted before the final design process 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. In addition, the Provincial Department of Environment and Nature Conservation should be consulted on whether a permit is required for the clearance of indigenous vegetation on site. The Provincial Department of Environment and Nature Conservation have been pre-identified as a key stakeholder and therefore included on the project database (as shown in Appendix C of this EIA Report). As such, the Provincial Department of Environment and Nature Conservation was provided with a copy of the BID, Letter 1, and Comment and Registration Form during the Project Initiation Phase. In addition, the Provincial Department of Environment and Nature Conservation were provided with a hard copy and CD copy of the Scoping Report (Refer to Appendix E for proof of correspondence). Comments received from the Department following the review of the Scoping Report are included in Chapter 6 and in Appendix G. The Department will also be provided with a hard copy and CD copy of the Boven PV4, EIA Report.

4.2.2.2. The Provincial Spatial Development Framework for the Northern Cape (Office of the Premier of the Northern Cape, 2012)

The Provincial Spatial Development Framework (PSDF) identified a Solar Corridor where solar projects will be given priority. According to the PSDF, this Solar Corridor “centres around Upington and extends from roughly Kakamas in the north to De Aar in the east” (Department of Co-operative Governance, Human Settlements and Traditional Affairs, 2012, Page 68). The proposed Boven Solar PV4 (PTY) LTD Project does not fall within this corridor.

4.2.3. Local Planning Legislation

4.2.3.1. ZF Mgcawu Spatial Development Framework (Siyanda DM 2012)

The Solar Corridor is seen as an initiative that ‘should be pursued vigorously.’ The corridor follows the main routes from Prieska to Upington and further along the N10. However, the Spatial Development Framework (SDF) map (Page 221) shows that the corridor also extended along the N14 west. There are also a number of solar energy projects outside these corridors. Proposal SB7 for Southern Bushmanland relates to solar projects: “Sensitively place solar projects within the Solar Corridor with due regard to the visual impact of these facilities and the siting principles in Section 6.3.7”. Siting principles address wind farms rather than solar plants.

4.2.3.2. !Kheis Rural SDF (!Kheis Municipality 2014)

Natural scenic beauty of the municipality and production of solar energy are both seen as opportunities based on its existing bio-physical conditions. Tourism opportunities for this municipality potentially relevant to the proposed development include agricultural tourism, landscape tourism and game farms. Solar energy projects are suggested for the remote areas of the municipality although no indication is given where this should be (other than the Solar Corridor).

4.2.3.3. Kai !Garib SDF (Kai !Garib Municipality 2012)

Kenhardt and its surrounding rural area are seen as an agricultural region with a scenic environment and important cultural heritage. Dust pollution is seen as a factor that “must be taken into consideration with future developments”. Solar projects are mainly located along the Orange River and within the Solar Corridor, but there are projects south-west of Kenhardt indicated on the resources map.

4.2.3.4. Eskom Electrical Grid Infrastructure SEA

The DEA is undertaking an SEA for Electrical Grid Infrastructure (EGI) to assist Eskom with identifying priority corridors and to improve environmental regulatory processes inside the corridors in support of Strategic Infrastructure Project (SIP) 10. As part of the EGI SEA, five preliminary corridors were identified, namely the central, eastern, international, northern and western corridor. The preliminary corridors were later refined as part of the SEA process and final corridors have been put forward. Figure 4.1 below shows the preliminary and final corridors assessed as part of the EGI SEA.

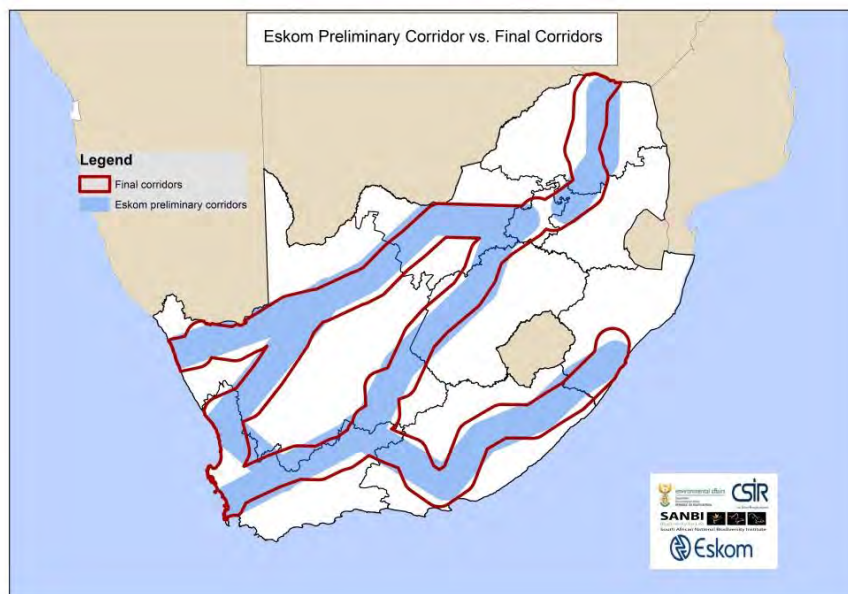


Figure 4.1: Eskom Preliminary and Final Corridors assessed as part of the EGI SEA (CSIR, 2015b)

During the Scoping Phase (as part of the review of the Scoping Report), the Provincial Department of Environment and Nature Conservation commented that the proposed development does not form part of the EGI SEA as it falls outside one of the corridors identified by Eskom (i.e. the Western Corridor). However based on the final corridors, as shown below in Figure 4.2, the proposed project does fall within the EGI SEA.



Figure 4.2: Eskom Final Corridor assessed as part of the EGI SEA and the Location of the proposed Boven PV4 project and Transmission Line. Image Source: Google Earth, 2016

4.2.4. Guidelines, Frameworks and Protocols

- Public Participation Guideline, October 2012 (Government Gazette 35769);
- DEA&DP and DEA Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - Guideline on Renewable Energy Project (DEA, October 2015);
 - Guideline on Transitional Arrangements (DEA&DP, March 2013);
 - Guideline on Alternatives (DEA&DP, March 2013);
 - Guideline on Public Participation (DEA&DP, March 2013); and
 - Guideline on Need and Desirability (DEA&DP, March 2013; DEA, 2014).
- Information Document on Generic Terms of Reference for 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 (DEADP; CSIR and Tony Barbour, 2005 – 2007);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

4.2.5. International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed Boven Solar PV4 (PTY) LTD Solar PV 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 of 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.
- Category C - Projects expected to have minimal or no adverse impacts, including certain financial intermediary projects.

Accordingly, a project such as the proposed solar PV project of Boven Solar PV4 (PTY) LTD is categorised as a Category B Project. The EA Process for Category B projects examines the project's potential negative and positive environmental impacts and compares them with those of feasible and reasonable alternatives (including the 'no-go' option scenario). As required for Category B projects a Scoping and EIA Process is being undertaken for the proposed Boven Solar PV4 (PTY) LTD Project.

Other Acts, standards and/or guidelines which may also be applicable will be reviewed in more detail as part of the full specialist studies to be conducted for the EIA.

4.3. Principles for Scoping and Public Participation

The Public Participation Process (PPP) for this Scoping and EIA Process is being driven by a stakeholder engagement process that will include inputs from authorities, Interested and Affected Parties (I&APs), technical specialists and the project proponent. Guideline 4 on "Public Participation in support of the EIA Regulations" published by DEAT in May 2006, states that public participation is one of the most important aspects of the EA 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 CA 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.

- "Provides an opportunity for I&APs, EAPs and the CA 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."

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, public participation aims to generate issues that are representative of societal sectors, not each individual. Hence, the PPP will be designed to be inclusive of a broad range of sectors relevant to the proposed project.
- 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 will aim 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.

4.4. Public Participation Process

The key steps in the PPP for the EIA Phase are described below. This approach has been confirmed with the DEA through their review and acceptance of the Plan of Study for EIA (DEA letter of Acceptance of the Scoping Report dated 29 January 2016 included in Appendix G of this EIA Report). The PPP for the Scoping Process is described in Chapter 4 of the finalised Scoping Report (CSIR, 2015).

As discussed in Chapter 1 of this EIA Report, an integrated PPP will be undertaken for the seven solar projects (i.e. Gemsbok Solar PV3-, PV4, PV5 and PV6 as well as Boven Solar PV2-, PV3 and PV4). Separate Scoping and EIA Reports have been compiled for each project and these have been made available for I&AP and authority review in an integrated manner. All advertisements, notification letters and emails etc. will serve to notify the public and organs of state of the joint availability of all reports for the abovementioned projects and will provide I&APs with an opportunity to comment on the reports. This process is outlined in Figure 4.4 of this chapter. As noted previously, this aforementioned integrated approach has been discussed with and approved by the DEA, as part of the pre-application meeting held on 17 September 2015 (Appendix H of this EIA Report). This approach is proposed due to the close proximity of the sites (i.e. the proposed projects will take place within the same geographical area) and that the proposed project will entail the same activity (i.e. generation of electricity with the use of solar PV panels).

It is important to note that in order to notify and inform the public of the proposed projects and invite I&APs to register on the project database, the project and EIA Process were advertised in one local newspaper (i.e. "The Gemsbok") during the Project Initiation Phase on 9 September 2015. A copy of the advertisement placed is contained in Appendix D of this EIA Report.

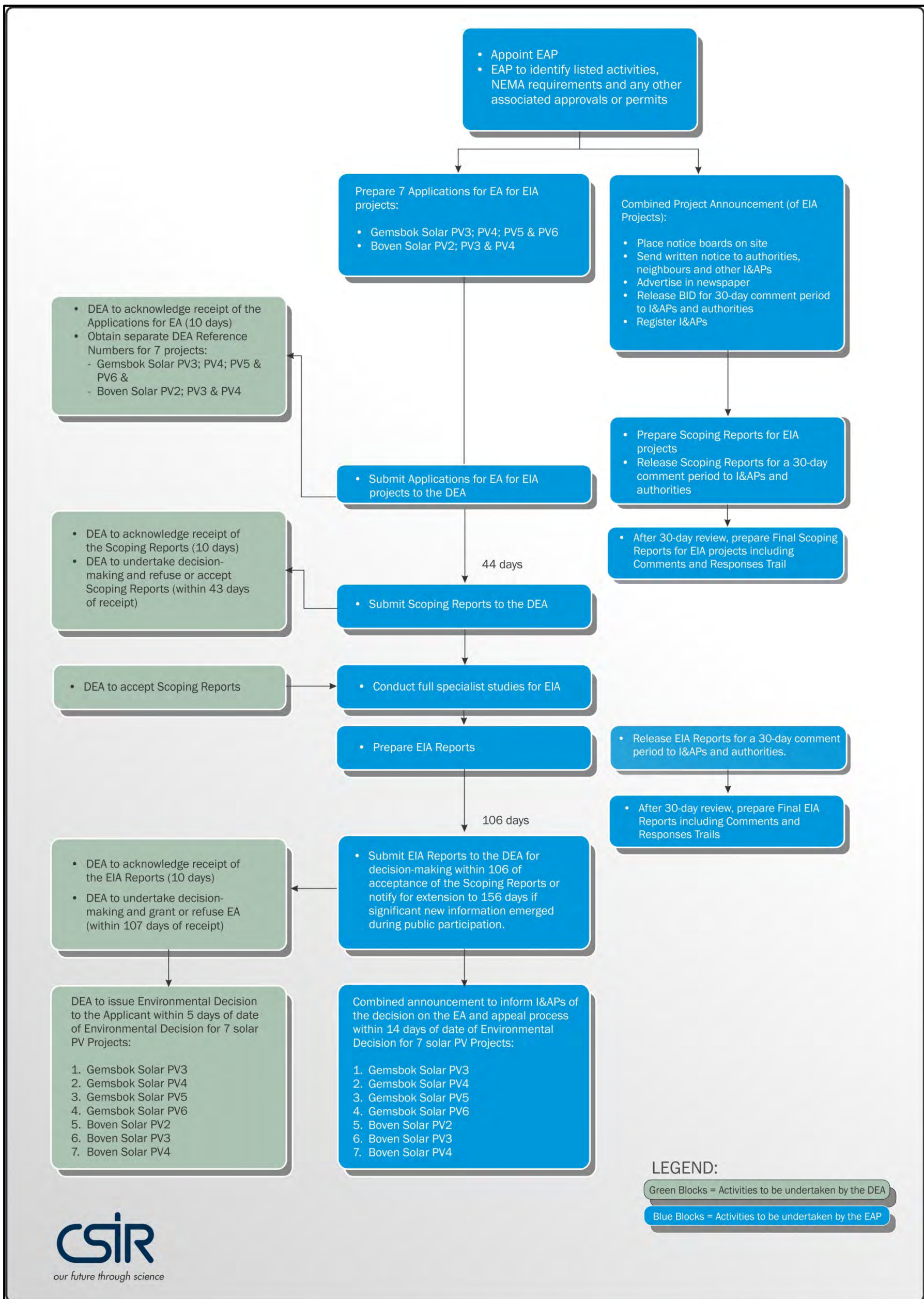


Figure 4.3: Joint Public Participation Process proposed for the Scoping and EIA Processes for the proposed Solar Photovoltaic Facilities near Kenhardt in the Northern Cape

Furthermore, Regulation 41 (2) (a) of the 2014 EIA Regulations requires that a notice board providing information on the project and EIA Process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site. To this end, notice boards were placed at the locations shown in Table 4.3 during the Project Initiation Phase. A copy of the notice boards and proof of placement thereof is included in Appendix F of this EIA Report.

Table 4.3: Site Notice Boards Placed for the Commencement of the Scoping and EIA Processes for the seven solar PV Projects

Location	Co-ordinates	Language
Entrance to the Transnet Service Road, which serves as one of the access routes to the (preferred and alternative) project sites.	29° 19' 47.79" S and 21° 9' 15.53" E	English and Afrikaans
Loop 14 of Saldanha Railway line (Transnet)	29° 8'32.06"S and 21°21'24.74"E	English and Afrikaans
Kenhardt Petrol Station	29° 20' 52.23" S and 21° 9' 7.97" E	Afrikaans
Kai !Garib Municipality Offices in Kenhardt	29° 20' 56.01" S and 21° 9' 7.69" E	English and Afrikaans
At the Transnet railway crossing (in close proximity to Gembok Solar PV5- and Gembok Solar PV6 Alternatives)	29° 5'42.73"S and 21°24'13.93"E	Afrikaans

The correspondence sent to I&APs during the Scoping Phase (including the submission of the finalised Scoping Reports to the DEA) is included in Appendix E of this EIA Report. Appendix G contains all the comments and correspondence received from I&APs during the Scoping Phase (i.e. during the Project Initiation Phase and 30-day review of the Scoping Reports). Appendices E and G will be respectively updated in the finalised EIA Report that will be submitted to DEA for decision-making with correspondence sent to I&APs for the release of the EIA Reports, and any comments received from I&APs during the review of the EIA Report.

TASK 1: I&AP REVIEW OF THE EIA REPORT AND EMPR (Current Stage)

The first stage in the process will entail the release of the EIA Reports for a 30-day I&AP and stakeholder review period. Relevant organs of state and I&APs will be informed of the review process in the following manner:

- Placement of one advertisement in The Gembok local newspaper to notify potential I&APs of the availability of the EIA Reports;
- A letter will be sent via registered mail as relevant and email to all registered I&APs and organs of state (where postal, physical and email addresses are available) on the database. The letter will include an update on the current status of the project and notification of the 30-day comment period for the EIA Reports and a Comment and Registration Form;
- It was noted in the Scoping Reports that a public meeting could possibly be held during the review of the EIA Reports, if warranted and if there is substantial public interest during the EIA Phase. However, due to the limited public input and/or interest in the proposed projects, this is not deemed necessary. Telephonic consultations with key I&APs will take place, upon request; and
- Meeting(s) with key authorities involved in decision-making for this EIA (if required and requested).

The EIA Reports will be made available and distributed through the following mechanisms to ensure access to information on the project and to communicate the outcome of specialist studies:

- Copies of the reports will be placed at the Kenhardt local library for I&APs to access for viewing;
- Key authorities will be provided with either a hard copy and/or CD of the EIA Reports;
- The EIA Reports will be uploaded to the project website (i.e. www.csir.co.za/eia/MuliloSolar); and
- Telephonic consultations will be held with key I&APs and organs of state groups, as necessary.

TASK 2: COMMENTS AND RESPONSES TRAIL

A key component of the EIA Process is documenting and responding to the comments received from I&APs and the authorities. The following comments on the EIA Reports will be documented:

- Written and emailed comments (e.g. letters and completed comment and registration forms);
- Comments made at focus group meetings (if required);
- Telephonic communication with CSIR project team; and
- One-on-one meetings with key authorities and/or I&APs (if required).

The comments received during the 30-day review of the EIA Reports will be compiled into a Comments and Responses Trail for inclusion in the finalised EIA Reports that will be submitted to the National DEA in terms of Regulation 23 (1) (a) for decision-making. The Comments and Responses Trail will indicate the nature of the comment, as well as when and who raised the comment. The comments received will be considered by the EIA team and appropriate responses provided by the relevant member of the team and/or specialist. The response provided will indicate how the comment received has been considered in the EIA Reports for submission to the National DEA and in the project design or EMPRs.

TASK 3: COMPILATION OF EIA REPORTS FOR SUBMISSION TO THE DEA

Following the 30-day commenting period of the EIA Reports and incorporation of the comments received into the reports, the EIA Reports (i.e. hard copies and electronic copies) will be submitted to the DEA for decision-making in line with Regulation 23 (1) (a) of the 2014 EIA Regulations. In line with best practice, I&APs on the project database will be notified via email (where email addresses are available) of the submission of the EIA Reports to the DEA for decision-making.

The EIA Reports that are submitted for decision-making will also include proof of the PPP that was undertaken to inform organs of state and I&APs of the availability of the EIA Reports for the 30-day review period (during Task 1, as explained above). To ensure ongoing access to information, copies of the EIA Reports that are submitted for decision-making and the Comments and Response Trail (detailing comments received during the EIA Phase and responses thereto) will be placed on the project website (www.csir.co.za/eia/MuliloSolar)

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

TASK 4: EA AND APPEAL PERIOD

Subsequent to the decision-making phase, all registered I&APs and stakeholders on the project database will receive notification of the Environmental Decision issued by DEA and the appeal period. The 2014 EIA Regulations (i.e. Regulation 4 (1)) states that after the Competent Authority has reached a decision, it must inform the Applicant of the decision, in writing, within five days of such a decision. Regulation 4 (2) of the 2014 EIA Regulations stipulates that I&APs need to be informed of the Environmental Decision and

associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EIA process and the appeal procedure and its respective timelines.

The following process will be followed for the distribution of the Environmental Decision and notification of the appeal period:

- An advertisement may be placed in The Gemsbok local newspaper to notify I&APs of the Environmental Decision and associated appeal process (this will be confirmed during the finalisation of the EIA process);
- A letter will be sent via registered mail and email to all registered I&APs and organs of state (where postal, physical and email addresses are available) on the database. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the Environmental Decision;
- A copy of the Environmental Decision will be uploaded to the project website (i.e. www.csir.co.za/eia/MuliloSolar); and
- All I&APs on the project database will be notified of the outcome of the appeal period in writing.

4.1 Authority Consultation during the EIA Phase

Authority consultation is integrated into the PPP, with additional one-on-one meetings held with the lead authorities, where necessary. It is proposed that the Competent Authority (DEA) as well as other lead authorities will be consulted at various stages during the EIA Process. At this stage, the following authorities have been identified for the purpose of this EIA Process (additional authorities might be added to this list as the EIA Process proceeds):

- National DEA;
- Department of Environment and Nature Conservation of the Northern Cape Province;
- DWS of the Northern Cape Province;
- Department of Energy of the Northern Cape Province;
- Department of Mineral Resources of the Northern Cape Province;
- Eskom Holdings SOC Ltd;
- Transnet SOC Ltd;
- Civil Aviation Authority;
- South African National Parks;
- Department of Social Development;
- National Energy Regulator of South Africa;
- National DAFF;
- DAFF of the Northern Cape Province;
- Department of Agriculture, Land Reform & Rural Development of the Northern Cape Province;
- Department of Public Works, Roads and Transport of the Northern Cape Province;
- Department of Labour;
- SKA;
- SAHRA;
- Ngwao Boswa Kapa Bokoni (Heritage Northern Cape);
- South African Civilian Aviation Authority;
- South African National Road Agency Limited;
- ZF Mgcau District Municipality;
- Kai! Garib Local Municipality; and
- !Kheis Local Municipality.

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	Site visit for authorities, if required.
During preparation of EIA Reports	Communication with the DEA on the outcome of Specialist Studies (if required).
On submission of EIA Reports for decision-making	Meetings with dedicated departments, if requested by the DEA, with jurisdiction over particular aspects of the project (e.g. Local Authority) and potentially including relevant specialists.

4.5. Schedule for the EIA

The proposed schedule for the EIA, based on the legislated EIA Process, is presented in Table 4.5. It should be noted that this schedule could be revised during the EIA Process, depending on factors such as the time required for decisions from authorities.

4.6. Approach to Impact Assessment and Specialist Studies

This section outlines the assessment methodology and legal context for specialist studies, as recommended by the DEA 2006 Guideline on Assessment of Impacts.

4.6.1. Generic TOR for the Assessment of Potential Impacts

The identification of potential impacts included impacts that may occur during the construction, operational and decommissioning phases of the development. The assessment of impacts is to include 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 impact assessment methodology has been aligned with the requirements for EIA Reports as stipulated in Appendix 3 (3) (j) of the 2014 EIA Regulations, which states the following:

- An EIA 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 (j)-
 - 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;
 - vii. the degree to which the impact and risk can be mitigated.

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

- 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. The cumulative impacts have been assessed by identifying other solar energy project proposals and other applicable projects, such as construction and upgrade of electricity generation, and transmission or distribution facilities in the local area (i.e. within 20 km of the proposed project area) that have been approved (i.e. positive EA has been issued) or is currently

underway. The proposed and existing electrical and solar developments that have been considered as part of the EIA Phase are provided in Table 4.8. The cumulative impacts were assessed in terms of each proposed Mulilo PV project as well. Cumulative effects associated with these similar types of projects include *inter alia*:

- Impact on vegetation and water courses;
- Impact on avifauna, including avifaunal collisions and mortalities;
- Impact on terrestrial fauna;
- Habitat destruction and fragmentation;
- Clearing of vegetation (including loss of protected species and Species of Special Concern);
- Loss of agricultural land;
- Loss of heritage resources;
- Increase in stormwater run-off and erosion;
- Increase in water requirements;
- Increased interference to the SKA project;
- Traffic impact;
- Visual impact;
- Socio-economic benefits; including social upliftment, employment opportunities and creation, and economic development;
- Negative social impacts (including influx of job seekers);
- Upgrade of infrastructure and contribution of renewable energy into the National Grid.

In addition to the above, the impact assessment methodology includes the following aspects:

- 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);
 - National; or
 - International (e.g. Greenhouse Gas emissions or migrant birds).
- Consequence – The anticipated consequence of the risk/impact:
 - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
 - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
 - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
 - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
 - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).
- 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)).

- 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) will be:
 - Yes: High reversibility of impacts (impact is highly reversible at end of project life);
 - Partially: Moderate reversibility of impacts; or
 - No: Impacts are non-reversible (impact is permanent).

- 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) will be:
 - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
 - Moderate irreplaceability of resources;
 - Low irreplaceability of resources; or
 - Resources are replaceable (the affected resource is easy to replace/rehabilitate).

Using the criteria above, the impacts will further be assessed in terms of the following:

- Probability – The probability of the impact/risk occurring:
 - Very likely;
 - Likely;
 - Unlikely;
 - Very unlikely; and
 - Extremely unlikely.

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (as shown in Figure 4.4). This approach incorporates internationally recognised methods from the IPCC (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity. The significance is then rated qualitatively against a predefined set of criteria (i.e. probability and consequence) as indicated in Figure 4.4:

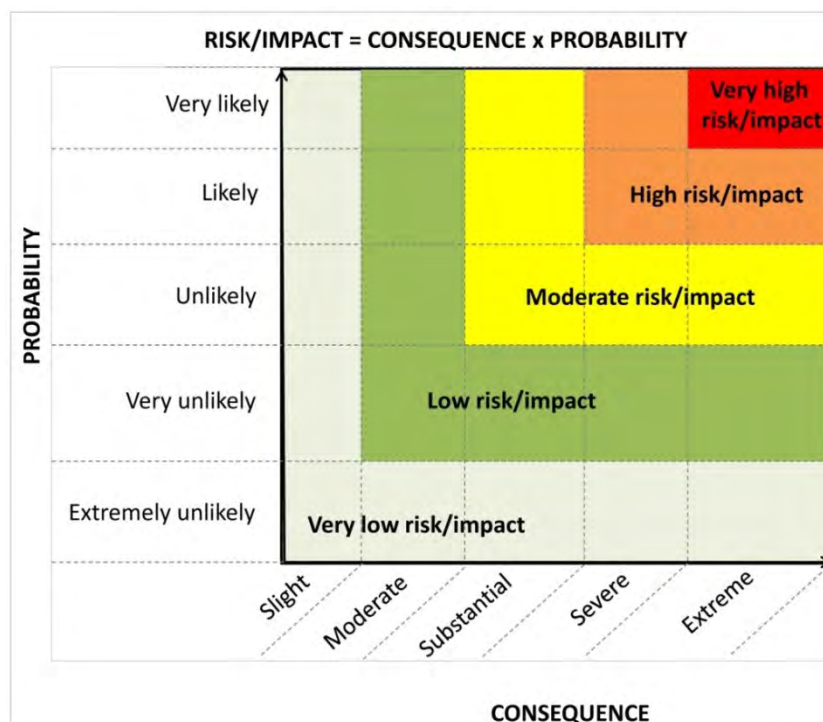


Figure 4.4: Guide to assessing risk/impact significance as a result of consequence and probability.

- 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 will be ranked as follows in terms of significance (based on Figure 4.4):

- Very low = 5;
 - Low = 4;
 - Moderate = 3;
 - High = 2; and
 - Very high = 1.
- Status - Whether the impact/risk on the overall environment 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 not be affected.
 - Confidence – The degree of confidence in predictions based on available information and specialist knowledge:
 - Low;
 - Medium; or
 - High.

Impacts have been collated into the EMPr (Section B of the EIA Report) and these include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be 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.
- Positive impacts and augmentation measures have been identified to potentially enhance positive impacts where possible.

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

- Impacts are evaluated for the construction and operation 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 have been 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 has, where possible, taken into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area (as described above and in Table 4.8); and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

Table 4.6 was used by specialists for the rating of impacts.

Table 4.6: Example of Table for Assessment of Impacts

Aspect/Impact Pathway	Nature of impact	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility	Irreplaceability	Mitigation Measures	Significance of Impact/Risk = Consequence x Probability		Ranking of Impact/Risk	Confidence Level
										Without Mitigation	With Mitigation		
CONSTRUCTION PHASE (EXAMPLE)													
Clearing of 150 ha of vegetation	Loss of Habitat and Species	Negative	Site Specific	Long term	Substantial	Very Likely	Yes	Moderate	Undertake Plant Search and Rescue prior to the commencement of construction	Moderate	Low	4	Medium
	Susceptibility of soil erosion on exposed surfaces	Negative	Site Specific	Medium term	Moderate	Likely	Yes	Moderate	Implement an Erosion Management Plan throughout the construction Phase	Moderate	Low	5	High

4.7. Terms of Reference for the Specialist Studies

The Terms of Reference (TOR) for the specialist studies essentially consist of the generic assessment requirements and the specific issues identified for each discipline. The TOR has been updated to include relevant comments received from I&APs and authorities during the 30-day review of the Scoping Reports.

The following specialist studies have been identified based on the issues identified to date, as well as potential impacts associated with the project. The TOR for each specialist study is discussed below. However, it should be noted that the detailed scope and methodology of the specialist studies are included in each relevant study (included in Chapters 7 to 15 of this EIA Report). The specialist studies and associated specialists are shown in Table 4.7 below.

Table 4.7: Specialist Studies and Associates Specialists

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Lukas Niemand	Pachnoda Consulting CC and Associates	Ecological Impact Assessment (including fauna and avifauna)
Ina Venter	Kyllinga Consulting (to be sub-contracted by Pachnoda Consulting CC)	Vegetation and Aquatic Impact Assessment
Henry Holland	Private Consultant	Visual Impact Assessment
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage Impact Assessment (Archaeology and Cultural Landscape)
Dr. John Almond	Natura Viva cc	Desktop Palaeontological Impact Assessment
Johann Lanz	Private	Soils and Agricultural Potential Assessment
Rudolph du Toit	CSIR	Socio-Economic Impact Assessment. This study was independently reviewed by an external socio-economic specialist, Ms Liza van der Merwe, in response to a request from DEA.
Technical Studies to inform the EIA Process		
A. J. Otto and P. S. van der Merwe	MESA Solutions	Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI)

Please note that RFI and EMI studies were undertaken and included in the EIA Report to determine potential impacts on the SKA SA Project and to determine the level of mitigation shielding required in order to comply with the SKA Regulations. A summary of the study is provided in Chapter 15; the full study is included in Appendix K of the EIA Report.

In terms of air quality, during the pre-construction phase the site will need to be cleared of vegetation, although the clearing of vegetation will only occur where roads, the on-site substation, foundations etc. need to be constructed, and the rest of the site will only be brush cut. Vegetation below the solar panels will not be cleared. The areas where the vegetation is cleared will expose bare soil to wind and as a result, dust will likely be generated from the movement of construction vehicles on the site. The generation of dust is expected to be short term and only last for the duration of the construction period. Standard dust control interventions used in civil construction projects will be applied in order to minimise dust generation. These interventions and relevant management actions have been incorporated into the EMPr for the proposed project (Part B of the EIA Report). It must also be borne in mind that dust reduces the effectiveness of the PV panels and therefore it is in the operator's best interest to minimise the dust from the project site during the project lifetime.

In terms of waste and noise emissions, appropriate waste and noise management actions will be incorporated into the EMPr (Part B of the EIA Report).

In terms of traffic, the traffic volumes contributed by the construction and operation phases of the facility on the existing traffic volumes are considered acceptable. To this end, a Traffic Impact Statement has been prepared by the EAP, which provides recommendations for inclusion in the EMPr (Part B of the EIA Report). The same approach was followed by the CSIR for the proposed Nieuwehoop Solar EIA (Phase 1) Project which has received a positive EA.

Furthermore, the issues that have been addressed in the specialist studies are detailed in each specialist report included in Chapters 7 to 15 of this EIA Report.

The TORs for each specialist study as included in Chapter 8 of the Scoping Report are included below:

4.7.1. Ecology Impact Assessment (including vegetation, fauna, avifauna and wetlands)

Broad TOR as follows:

- Identification of baseline ecological parameters, based upon the floral and faunal state of the preferred site;
- Consideration of ecological drivers upon the preferred site;
- Consideration of possible changes in drivers as well as direct impacts that would arise as a consequence of the establishment of the proposed facility;
- Identification of significance of such change and integration into impact evaluation methods;
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMPr); and
- Final consideration of planning and layout, as well as operations, will be undertaken to assist with the employment of the abovementioned mitigation measures.

Faunal Assessment (including Avifauna): Proposed Approach and Methodology:

- Conduct an assessment at a screening level of available information pertinent to the ecological and faunal attributes on the study area;

- Conduct an assessment of all information at a screening level in order to present the following results:
 - an indication on the occurrence of threatened, “near-threatened”, endemic and conservation important bird or animal species likely to be affected by the proposed project;
 - an indication of sensitive areas or bird and animal habitat types corresponding to the proposed project area;
 - highlight areas of concern or hotspot areas;
 - identify potential impacts on the terrestrial ecological and faunal environment that are considered pertinent to the proposed development; and
 - highlight gaps of information in terms of the faunal environment.

Mammals will be sampled by means of the following techniques:

- Fieldwork will include visual sightings by means of transect walks (including nocturnal surveys) to evaluate the presence of mammal taxa. During the site visit, specific attention will be given to signs (droppings, burrows, vocalisations, etc.) of taxa and the presence of suitable habitat;
- The mammal survey will be augmented by means of a small mammal trapping session and the strategic placement of wildlife (trail) cameras; and
- A full list of species observed and expected to occur will also be included. Specific reference will be made to the occurrence of Red Data species.

Herpetofauna (reptiles & amphibians) will be sampled by means of the following techniques:

- Visual observations (including nocturnal surveys);
- Active searching techniques; and
- Vocalisations (for amphibians).

Vegetation Assessment: Proposed approach and methodology:

The aerial photographs on site will be investigated prior to the site visit and different vegetation communities identified. A survey of the vegetation will be completed in each community. The vegetation will be recorded along random transect walks in each community and the cover-abundance of the vegetation indicated. A search for species of conservation importance will be completed. The habitat of the species will be investigated in an attempt to determine if the species are present on site.

Aquatic Assessment: Proposed approach and methodology:

Aerial photographs of the site will be investigated prior to the site visit. All the watercourse areas on the sites and within 500 m of the sites will be delineated based on the aerial photographs.

The watercourses (including wetlands, river and drainage features) on the sites will be delineated according to the DWS wetland and riparian delineation guideline (DWAF 2005). Several indicators are used to delineate riparian and wetland areas. The indicators include:

- Vegetation indicator;
- Terrain unit indicator;
- Soil form indicator; and
- Soil wetness indicator.

Overall, the Ecological Impact Assessment study will include the following tasks:

- Review detailed information relating to the project description and precisely define the environmental risks to the terrestrial and aquatic environment and consequences for ecology.
- Draw on desktop information sources, the knowledge of local experts, information published in the scientific press and information derived from relevant EIAs and similar specialist studies previously conducted within the surrounding area.
- Compile a baseline description of the terrestrial and aquatic ecology of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity. The description will include the major habitat forms within the study sites, giving due consideration to terrestrial ecology (flora), terrestrial ecology (fauna) and freshwater ecosystems/wetlands. The desktop review will be undertaken using spatial data, SANBI conservation data, as well as other related information.
- Provide specific ecological data in respect of the floral, faunal and aquatic components of the site using ground-truthing methods, with an emphasis on those areas considered to be of “high” and possibly, “moderate” sensitivity (based on the desktop study).
- Based on the desktop study, undertake field work and spot sampling across the sites to record relevant data and to compile an overview of the habitat under review. The field assessment will aim to confirm the nature and structure of the habitat within the study area from an ecological perspective, and it will aim to identify key ecological components within the study area and in specific, the sensitivity of the prevailing habitat, as well as the identification of any floral components worthy of consideration.
- Collate all data collected during the field work and undertake a statistical review using methodologies that allow for comparison of biological data.
- Consider wetlands (endoreic pans) and associated water resources within the site in terms of significance within the catchment, habitat value and significance and delineation of extent through preliminary on site evaluation and the use of aerial imagery interpretation (where these arise). Where affected by the proposed development (i.e. within 500 m of such systems), an application in terms of the NWA will be required.
- Undertake a faunal investigation on site based on the points identified during the preliminary aerial photographic interpretation.
- Incorporate relevant information from other specialist report/findings if required.
- Provide a detailed terrestrial and aquatic ecological sensitivity map of the site, including mapping of disturbance and transformation on site.
- Identify and rate potential direct, indirect and cumulative impacts on the terrestrial and aquatic ecology, communities and ecological processes within the site during the construction, operation and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facility in the area or other type of developments which may lead to cumulative impacts (e.g. power lines), together with the impact of the proposed project.
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored to ensure that the impacts on the terrestrial and aquatic ecology are limited (these measures should be included in the EMPR).
- Compile an assessment report qualifying the risks and potential impacts on terrestrial and aquatic ecology in the study area and impact evaluations.
- Determine if a WUL is required and if so, determine the requirements thereof.

4.7.2. Avifaunal Impact Assessment

Proposed Approach and Methodology

Birds will be sampled by means of the following techniques:

- Active searching and the compilation of a bird inventory while traversing as much of the available habitat types;
- The occurrence of cryptic or elusive Red Data species will be verified by playback of their respective calls;
- The identification and mapping of areas while focussing on structural and topographical cues that represent suitable habitat for species of concern;
- A landscape analysis of important flyways or daily flight paths corresponding to important landscape features (e.g. rivers, ravines and topographical features); and
- Preliminary density estimates will be collected by means of point counts to evaluate the dominant/typical species and their respective relative densities at each site. At each point the number of bird species seen will be recorded, as well as their respective abundances and distance from the observer (by means of a rangefinder). Each point count will last approximately 10 minutes. To ensure the independence of observations, points will be at least 200 m apart. The data generated from the point counts will be analysed according to Clarke & Warwick (1994) based on the computed percentage contribution (%) of each species including the consistency (calculated as the similarity coefficient/standard deviation) of its contribution to the each habitat type.

Terms of Reference

- Review detailed information relating to the project description and precisely define the environmental risks to avifauna.
- Draw on desktop information sources, the knowledge of local experts, information published in the scientific press and information derived from relevant EIAs and similar specialist studies previously conducted within the surrounding area.
- Compile a baseline description of the avifaunal ecology of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity. The description will include the major habitat forms within the study sites, giving due consideration to terrestrial ecology avifauna). The desktop review will be undertaken using spatial data, SANBI conservation data, as well as other related information.
- Collate all data collected during the field work and undertake a statistical review using methodologies that allow for comparison of biological data.
- Undertake an avifaunal investigation on site based on the points identified during the preliminary aerial photographic interpretation.
- Incorporate relevant information from other specialist report/findings if required.
- Provide a detailed sensitivity map of the site, including mapping of disturbance and transformation on site.
- Identify and rate potential direct, indirect and cumulative impacts on the avifaunal ecological processes within the site during the construction, operation and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facility in the area and other type of developments which may lead to cumulative impacts (e.g. power lines) within the study area, together with the impact of the proposed project.
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored to ensure that the impacts on the terrestrial and aquatic ecology are limited (these measures should be included in the EMPR).

- Assess the severity and significance of the potential impacts in terms of direct, indirect and cumulative impacts. Study the cumulative impacts of the project by considering the impacts of the proposed solar facility, together with the impact of the other proposed projects within the area.
- Incorporate and address issues and concerns raised during the Scoping Phase of the EIA where they are relevant to the specialist's area of expertise;
- Provide recommendations with regard to potential monitoring programmes and for inclusion in the EMPr; and
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMPr).

4.7.3. Visual Impact Assessment

The assessment will follow guidelines for Visual Impact Assessments provided by the Provincial Government of the Western Cape (PGWC) and CSIR (Oberholzer, 2005), and the Landscape Institute of the UK (GLVIA, 2002). Land Planning guides, Spatial Development Frameworks, and IPDs and other documentation relevant to the region will be referenced as part of the study.

Approach and Methodology

- **Desktop Review and Analysis**
 - A desktop review will be undertaken to inform the assessment process in terms of documentation (e.g. municipal and regional planning policy, spatial development frameworks, legislation, national and international examples of similar developments) and availability of data (sensitive landscapes and visual receptors, spatial data for visibility analyses and landscape assessment). It also provides a basis for evaluating the confidence levels for the overall assessment.
 - A GIS and available spatial data will be used during the desktop review to determine areas of scenic interest (Nature Reserves, sites of cultural importance, heritage sites), potential sensitive receptors (viewpoints, residences), preliminary zone of visual influence, and principal representative viewpoints.
 - The following elements and activities are likely to be relevant to the Visual Impact Study
 - Solar panel arrays;
 - On-site electrical infrastructure including on-site substation with transformers;
 - Internal access road network;
 - Office building and storage warehouse;
 - Overhead power lines connecting the plant to the Nieuwehoop Substation;
 - Electric fencing; and
 - Construction activities and laydown areas.
- **Field Survey**
 - A field survey will be undertaken and will make use of results of the desktop analysis to provide the following:
 - Photographic record of landscape elements within the study area;
 - Photographic record of the visual baseline for views from principal viewpoints;
 - The actual zone of visual influence by determining the effect of vegetation, buildings and topography on visibility in the study area;
 - Identification of sensitive receptors (viewers and landscape elements that will be affected by the proposed development); and
 - State of the current nightscape of the region.

- **Landscape Baseline**
 - A Landscape Baseline will thereafter be developed and will incorporate results from the desktop review and field survey to provide a description of the existing character and condition of the landscape. Landscape character reflects various factors such as geology, topography, land cover/use and human settlements that combine in particular ways to form the landscape. These factors will be described, as well as the ways they combine to create unique landscape types within the study area. The landscape condition refers to the current state of the landscape in terms of human impact. The value attached to the landscape by local residents and other sensitive receptors will also be determined where possible.
- **Visual Baseline**
 - Information gathered during the field survey on the influence of vegetation and topography on the potential visibility of the development will provide a basis for determining the actual Zone of Visual Influence of the development, and the practical extents of the area for which the visibility analyses will be done. Cumulative viewsheds will be calculated for various components of the development, as well as for other sites and layouts under consideration. The viewsheds will be used to determine the potential visibility of the various sites and elements, as well as to identify and classify visual receptors (viewers and principal representative viewpoints) in terms of their sensitivity to changes in the quality of their views.

Terms of Reference

- Describe, in sufficient detail, the existing landscape and visual conditions of the surrounding region to form a baseline against which impacts can be measured and compared;
- Identify potential visual impacts that may occur during construction, operational and decommissioning phases of the development, as well as future potential impacts that may occur if the plant is not developed (the “no go” option), both positive and negative impacts;
- Assess the severity and significance of the potential impacts in terms of direct, indirect and cumulative impacts. Study the cumulative impacts of the project by considering the impacts of the proposed solar facility, together with the impact of the other proposed projects within the area.
- Incorporate and address issues and concerns raised during the Scoping Phase of the EIA where they are relevant to the specialist’s area of expertise;
- Provide recommendations with regard to potential monitoring programmes and for inclusion in the EMPr; and
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMPr).

4.7.4. Heritage Impact Assessment (Archaeology and Cultural Landscape)

Approach and Methodology

The following broad TOR has been specified for the Heritage Impact Assessment (including Archaeology and Cultural Landscape) to be undertaken during the EIA Phase:

- Prepare and undertake a desktop study on the fossil heritage, archaeology, and heritage sites within the proposed project area.
- Undertake a detailed field examination of the archaeological sites and heritage features within or in the region of the development area.
- Describe the type and location of known archaeological sites and in the study area, and characterize all heritage items that may be affected by the proposed project.

- Describe the baseline environment and determine the status quo in relation to the specialist study.
- Record sites of archaeological relevance (photos, maps, aerial or satellite images, GPS co-ordinates, and stratigraphic columns).
- Evaluate the potential for occurrence of archaeological features within the study area.
- Identify and rate potential direct, indirect and cumulative impacts of the proposed project on the archaeological heritage for the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facility, together with the impact of other similar or related projects in the area (or being proposed);
- A Heritage Impact Assessment (HIA) report will be produced detailing the findings of the impact assessment. The report will cover all aspects of heritage (including graves, built environment and the cultural landscape) as required by the National Heritage Resources Act (NHRA) (Act 25 of 1999), including archaeological aspects. However, the archaeology is expected to be the primary element of concern in the study area. The cultural values and sense of place will also be informed by the Visual Impact Assessment study (discussed above in Section 8.8.2 of this chapter) by integrating the visual aspects into the HIA in relation to the landscape pattern and cultural values. The Socio-economic Assessment (discussed in Section 8.8.6 of this chapter) will also highlight the effect that the proposed solar facility will have on the local inhabitants' sense of place; and
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMPr); and
- Provide input to the EMPr, including mitigation measures and monitoring requirements to ensure that the impacts on the archaeology are limited.

4.7.5. Desktop Palaeontological Impact Assessment Approach and Methodology

Based on the low palaeontological sensitivity of the area a desktop Palaeontology Impact Assessment will be conducted. The study will be informed by the findings of the Palaeontological Impact Assessment that was conducted for the adjacent Mulilo Nieuwehoop Phase 1 project. The Palaeontology Impact Assessment will be used to identify possible palaeontological sites or features by making use of desktop sources. The study will assess the significance of such sites, describe the possible impact of the proposed project on these sites and identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMPr). The study will also assess cumulative impacts. The desktop study will be conducted in accordance with the requirements of the NHRA.

4.7.6. Soil and Agricultural Potential Assessment

Sufficient fieldwork was conducted for the adjacent Mulilo Nieuwehoop Phase 1 Solar PV facility, so no further fieldwork is required for the development of the proposed solar PV facility, especially given the low agricultural potential of the area.

Approach and Methodology

The study will assess the following:

- Assessment of the impacts of specific construction activities and layout on loss of topsoil:
 - The EIA Phase will include an assessment of the specifics of construction activities and the proposed development layout on potential loss of topsoil, and the availability of topsoil for rehabilitation.

- Assessment of specific on-site agricultural activities
 - The EIA Phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues. This will be done through interviews with farmers and agricultural role players in the area.

Terms of Reference

The report will fulfil the TOR for an agricultural study as set out in the National Department of Agriculture's document, Regulations for the evaluation and review of applications pertaining to renewable energy on agricultural land, dated September 2011, with an appropriate level of detail for the agricultural suitability and soil variation on site (which may therefore be less than the standardised level of detail stipulated in the above regulations).

The above requirements together with requirements for an EIA specialist report may be summarised as:

- Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Map soil survey points.
- Describe the topography of the site.
- Do basic climate analysis and identify suitable crops and their water requirements.
- Summarise available water sources for agriculture.
- Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options.
- Describe the erosion, vegetation and degradation status of the land.
- Determine and map, if there is variation, the agricultural potential across the site.
- Determine and map the agricultural sensitivity to development across the site.
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMP). These measures must ensure that negative socio-economic impacts are limited and positive impacts are enhanced.

4.7.7. Socio-Economic Impact Assessment Approach and Methodology

The following will be provided as part of the Socio-Economic Impact Assessment:

- Profile of the existing socio-economic environment
- A review of existing information, and collecting and reviewing baseline social information etc.
- Conducting interviews with key affected parties, including local communities, local landowners, key government officials (local and regional) etc.
- An identification and assessment of key social issues and potential impacts/risks (negative and positive) associated with the construction, operational and decommissioning phases of the project.
- An identification and assessment of key impacts on overall economic development potential in the area including impacts on commercial enterprises nearby the site (e.g. tourism, agriculture).
- An outline of mitigatory measures and additional management or monitoring guidelines.
- Assess cumulative impacts.
- Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored (these measures should be included in the EMP). These measures must ensure that negative socio-economic impacts are limited and positive impacts are enhanced.

In order to establish the existing socio-economic environment affected by the projects (i.e. the baseline socio-economic environment), information would be gathered from the following sources:

- Information generated during consultations with the public and authorities;
- Desktop review of Socio-Economic Impact Assessments previously undertaken in the study area
- Statistical databases such as Census information and StatsSA; and
- Local economic development and planning documents (including the Integrated Development Plan of the Local Municipality)

The Socio-Economic Impact assessment will separately assess the impacts of each of the seven projects forming part of the proposed Mulilo Solar PV Development but will also assess the cumulative socio-economic impacts associated with this development and other, relevant projects that are currently operational or reasonable expected to become operational within the study area.

Guidance on approach and methodology will be taken from the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) guidelines on economic specialist input to EIA processes which are broadly based on a cost-benefit approach to assessment (Van Zyl et al., 2005). This includes guidance on the appropriate level of detail required for the assessment that it is adequate to inform decision-making without going into redundant detail. While these guidelines were developed as part of a Western Cape government initiative, they are equally applicable to other parts of South African and were endorsed at a national level by the then Department of Environment Affairs and Tourism. Impact significance ratings will be generated using CSIR impact rating methodology.

The Socio-Economic study will be prepared in-house by the CSIR specialist and will be independently reviewed by an external consultant as requested by DEA.

4.7.8. Square Kilometre Array (SKA) Studies

Approach and Methodology

The Nieuwehoop properties are situated in the vicinity of the Karoo Central Astronomy Advantage Area 2. These areas are protected against unwanted electromagnetic interference (EMI) under the Astronomy Geographic Advantage (AGA) Act for the purpose of radio astronomy and related scientific endeavours. This currently includes the SKA project. The proximity of the project to the closest SKA station may potentially have an impact on the SKA project. Facilities within 10 km from the closest telescopes are likely to pose a high risk to the SKA and would require detailed investigation and effort to mitigate likely interference. Facilities located 20 km and further away are likely to pose a medium to low risk. Even for a medium risk facility, mitigation measures would have to be incorporated in order to reduce the potential impact. The risk is dependent on the terrain profile. The landscape in the area is relatively flat, which means that there are no significant natural topographical barriers to help attenuate EMI.

The purpose of the investigation during an EIA is to do an impact assessment for each of the proposed plants within the project and will be used to determine the cumulative effect on the relevant SKA telescopes.

In terms of RFI, MESA Solutions conducts a basic overview of the design that will be used for all proposed plants. This includes mitigation recommendations to be implemented which will help limit excessive radio frequency interference (RFI) produced by the plant. Next, through propagation analysis, terrain evaluation is conducted to determine which topographical influences, if any, natural features will have on the total expected propagation attenuation based on the location of the different sites. This determines the maximum allowable emission levels which the facility may generate in order to still comply with SKA threshold limits as specified by SARAS (South African Radio Astronomy Services). Finally we sum the

cumulative impacts of the multiple projects in the area. Using the attenuation maps and topographical profiles, we calculate acceptable levels to be measured at a fixed distance from the plant that will produce radiated emission levels below the SKA threshold as defined by SARAS. An investigation as to whether a finite number of Solar PV plants would breach the SKA thresholds will be undertaken. If it is found that the cumulative impacts of the projects in this area are to exceed this amount, recommendations will be made to limit the number of projects to below this figure.

The methodology for Cumulative Impact Assessment:

In the case where there is more than one source of interference for a specific frequency, the cumulative effect should be considered by taking into account:

$$P_{\text{Accumulative}} = 10 \log_{10} (N)$$

Where N = the number of interference sources (PV Plants). This formula calculates the theoretical increase in interference levels and is therefore subtracted from the maximum allowable radiated limits. Their calculation would therefore take into account all approved solar PV projects in the vicinity (20 km) along with the planned projects subject to this Phase 2 report as well as the three Solar PV Projects proposed by Scatec within the same area. The specialist will assess all alternative and preferred sites and comment on their preference.

The results will focus on the maximum allowable E-Field level for each of the plants compared to the CISPR 11/22 Class B standard. These results will be provided to the SKA office who will conduct their own impact assessment which will then rate the proposed projects low, medium or high risk.

4.8. Cumulative impacts

It should be noted that cumulative impacts were assessed by the specialists in all the specialist studies mentioned above in the EIA phase. The cumulative impacts were assessed of this particular project in relation to the other six Solar PV projects proposed by Mulilo for their Phase 2 solar development as well as the other proposed Solar PV projects with the study area and other relevant projects. The projects that are being undertaken or are proposed to be undertaken within 20 km of the proposed project are detailed in Table 4.8 and in Figure 4.5.

Table 4.8: EIA Processes currently underway within 20 km of the proposed project

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Nieuwehoop 400/50 kV Substation loop in and loop out lines, Northern Cape Province.	Eskom Holdings SOC Limited	DEA Reference Number: 12/12/20/1166	Construction of the 400/50kv Nieuwehoop substation between the Garona and Aries substations, and 3 km Loop In and Loop Out Lines.	The project received a positive EA on 21 February 2011. The construction of the Nieuwehoop Substation has commenced.
EIA, WULA and EMPr for the proposed Solar CSP Integration Project: Project 1 – Solar substation, 2 X 400 kV power lines from Aries to the solar substation and 400 kV power line from Nieuwehoop to the Solar substation.	Eskom Holdings SOC Limited	DEA Reference Number: 12/12/20/2606 NEAS Reference Number: DEA/EIA/0000785/2011	The proposed Solar Park Integration Project entails the construction of a substation at the Upington Solar Park, 400 kV transmission lines to the east and south of Upington to feed the electricity into Eskom’s National Grid as well as the construction of a number of 132 kV power lines inter-linking the IPP solar plants with the Eskom Grid and distributing the power generated to Upington.	The project received a positive EA on 14 February 2014.
Proposed construction of Gembok PV1 75 MW Solar PV facility on the remaining extent of Portion 3 of the Farm Gembok Bult 120, Kenhardt, Northern Cape (i.e. this project).	Mulilo Renewable Project Developments (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/710	Mulilo Renewable Project Developments (Pty) Ltd intends to develop a 75 MW Solar PV power generation project on the farm Gembok Bult (Remaining Extent of Portion 3 of Farm 120).	These projects were being undertaken in parallel (i.e. joint PPP) and are collectively referred to as the Nieuwehoop Solar Development. DEA issued EA for all three proposed solar PV Facilities on 11 November 2015.
Proposed construction of Gembok PV2 75 MW Solar PV facility on the remaining extent of Portion 3 of the Farm Gembok Bult 120, Kenhardt, Northern Cape.	Mulilo Renewable Project Developments (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/711	Mulilo Renewable Project Developments (Pty) Ltd intends to develop a 75 MW Solar PV power generation project on the farm Gembok Bult (Remaining Extent of Portion 3 of Farm 120).	
Proposed construction of Boven PV1 75 MW Solar PV facility on the remaining extent of the Farm Boven Rugzeer 169,	Mulilo Renewable Project Developments (Pty) Ltd	DEA Reference Number: 14/12/16/3/3/2/712	Mulilo Renewable Project Developments (Pty) Ltd intends to develop a 75 MW Solar PV power generation project on the farm Boven Rugzeer (Remaining Extent of Farm 169).	

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Kenhardt, Northern Cape.				
Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 2) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape.	Scatec Solar	DEA Reference Number: 14/12/16/3/3/2/838	Scatec Solar intends to develop a 75 MW Solar PV power generation project on the remaining extent of Onder Rugzeer Farm 168.	These projects are being undertaken in parallel (i.e. joint PPP). The EIA Reports have been released for a 30-day comment period.
Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape.	Scatec Solar	DEA Reference Number: 14/12/16/3/3/2/836	Scatec Solar intends to develop a 75 MW Solar PV power generation project on the remaining extent of Onder Rugzeer Farm 168.	
Proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 1) on the remaining extent of Onder Rugzeer Farm 168 and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	DEA Reference Number: 14/12/16/3/3/2/837	Scatec Solar intends to develop a 132 KV transmission line extending from the proposed 75 MW Solar PV facility (Kenhardt PV 1) to the Eskom Nieuwehoop substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120.	These projects are being undertaken in parallel with Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 (i.e. joint PPP). The BA Reports are currently being released for a 30-day comment period.
Proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 2) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern	Scatec Solar	To be confirmed	Scatec Solar intends to develop a 132 KV transmission line extending from the proposed 75 MW Solar PV facility (Kenhardt PV 2) to the Eskom Nieuwehoop substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120.	

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Cape.				
Proposed development of a 132 kV Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	To be confirmed	Scatec Solar intends to develop a 132 KV transmission line extending from the proposed 75 MW Solar PV facility (Kenhardt PV 3) to the Eskom Nieuwehoop substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120.	
This project forms part of a proposal by Mulilo Renewable Project Developments (PTY) LTD to construct and operate seven PV or Concentrated PV Solar Facilities with a generating capacity of 75 MW each and associated infrastructure (including a 132 kV powerline). The cumulative impacts of all the proposed seven Solar PV Projects will be assessed.	Mulilo Renewable Project Developments (PTY) LTD	Gemsbok Solar PV3: 14/12/16/3/3/2/841 Gemsbok Solar PV4: 14/12/16/3/3/2/842 Gemsbok Solar PV5: 14/12/16/3/3/2/843 Gemsbok Solar PV6: 14/12/16/3/3/2/844 Boven Solar PV2: 14/12/16/3/3/2/845 Boven Solar PV3: 14/12/16/3/3/2/846 Boven Solar PV4: 14/12/16/3/3/2/847	The proposed facilities will be located on Portions 3 and 8 of Gemsbok Bult Farm 120 and the Remaining extent of Boven Rugzeer Farm 169, located 30 km north-east of Kenhardt. Two of the projects will be located on Portion 3-, two projects on Portion 8 of Gemsbok Bult Farm 120 and three projects on the Remaining Extent of Boven Rugzeer Farm 169. Each proposed 75 MW Solar PV facility will cover an approximate area of 220 ha with a collective footprint of approximately 1 540 ha and a combined power generation capacity of 525 MW. The proposed projects will entail the construction of the solar field, buildings, electrical infrastructure, internal access roads, and associated infrastructure and structures.	These projects are being undertaken in parallel (i.e. joint PPP). DEA accepted the Scoping Reports on 28 and 29 January 2016 for the Gemsbok Solar PV and the Boven Solar PV projects respectively. The EIA Reports are currently being released for a 30-day commenting period (current stage)

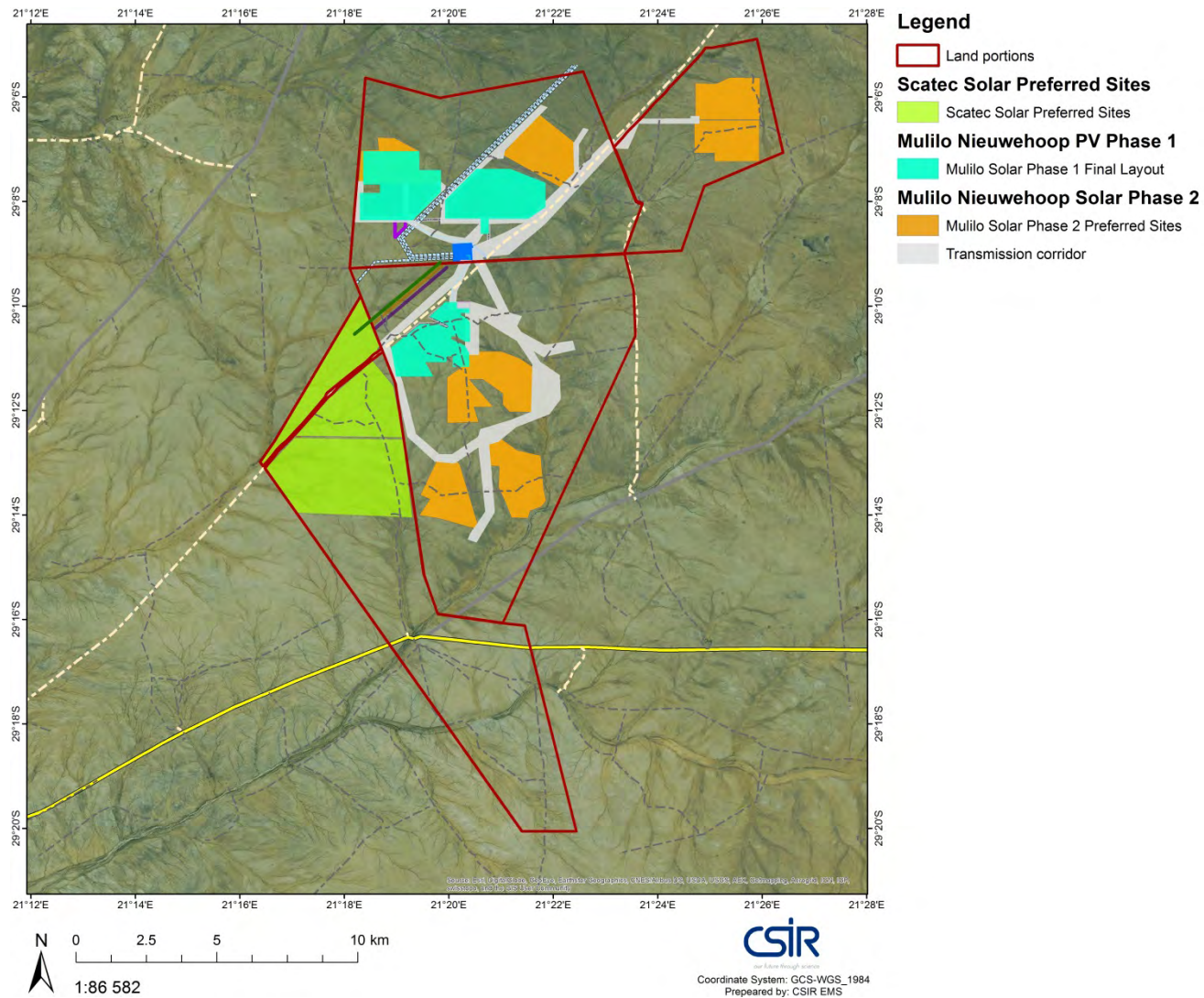


Figure 4.5: Proposed Solar PV Projects within the study area

4.9. Key Milestones of the EIA Process

The key milestones and proposed timeframes of the EIA process are indicated in Table 4.9.

Table 4.9: Key milestones and proposed timeframes

Key Milestones activities	Proposed Timeframe
Project Announcement and Review of BID	September 2015 – October 2015
I&AP, Stakeholder and Authority Review of the Scoping Report: 30 days	October 2015 – November 2015
Submit Scoping Report to the DEA for Decision-making.	December 2015
Review of the Scoping Report by the DEA (i.e. accept or refuse EA): 43 days since receipt of the Scoping Report.	December 2015 – January 2016
Compile the EIA Report	January 2016-March 2016
I&AP, Stakeholder and Authority Review of the EIA Report: 30 days	March 2016 – April 2016 (current stage)
Submit EIA Report to the DEA for Decision-making.	May 2016
Review of the EIA Report by the DEA (i.e. grant or refuse EA): 107 days since receipt of the EIA Report.	May 2016 – August 2016
Next steps: 5 days for notification to applicant	



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 5: Project Alternatives

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5. APPROACH TO THE ASSESSMENT OF ALTERNATIVES

This chapter discusses the alternatives, as well as the selection process of the preferred alternatives that have been considered and assessed as part of the EIA Phase.

The 2014 EIA Regulations (GN R982) 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 2 of the 2014 EIA Regulations provides the following objectives of the Scoping Process in relation to alternatives:

- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process; and
- To identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment.

The Scoping Report therefore provided a full description of the process followed to reach the proposed preferred activity, site and location within the site, including details of all the alternatives considered and the outcome of the site selection matrix. For additional information regarding the alternatives that were considered during the Scoping Phase, refer to the finalised Scoping Report (CSIR, 2015).

Sections 24(4) (b) (i) and 24(4A) of the NEMA require an EIA 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.

5.1. Assessment of Alternatives

5.1.1. No-go Alternative

The no-go alternative assumes that the proposed Solar PV project will not go ahead i.e. it is the option of not constructing the proposed Boven Solar PV4 Facility. This alternative would result in no environmental impacts on the sites or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report. At present the proposed site is zoned for agricultural land-use and is mostly used for livestock grazing. Preliminary investigations indicate that the area is classified as non-arable and low potential grazing land – hence, utilising the area for continued agricultural land-use is not a preferred or sustainable alternative. A detailed Soil and Agricultural Potential specialist study has been conducted during the EIA phase in order to identify and assess the potential impacts of the proposed development on soils and agricultural potential for both environmental and economic aspects (Chapter 11 of the EIA Report).

The costs/implications and benefits of implementing the ‘no-go’ alternative is presented in Table 5.1. Implementing the ‘no-go’ alternative entails that this solar energy facility will not be contributing to environmental, social and economic change (positive/negative) in the area proposed at the project site.

Table 5.1: The costs and benefits of implementing the ‘no-go’ alternative (i.e. no Boven Solar PV4 development)

COSTS	BENEFITS
<ul style="list-style-type: none"> • 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 this project at this location. The proposed 75 MW facility is predicted to generate approximately 200 GW/h per year which could power 50 000 households. • The “no go” alternative will not contribute to and assist the government in achieving its proposed renewable energy target of 17 800 MW by 2030. • Additional power to the local grid will need to be provided via the Eskom grid, with approximately 90% coal-based power generation with associated high levels of CO₂ emissions and water consumption. • Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed sites) and the local economy will not be diversified. • Electricity produced from solar power is cheaper than coal-produced electricity. The ‘no-go’ alternative thus entails higher electricity costs. Local communities will continue their dependence on agriculture production and government subsidies. The local municipality’s vulnerability to economic downturns will increase because of limited access to capital. • There will be no opportunity for additional employment in an area where job creation is identified as a key priority. It is estimated that between 60 and 90 skilled and 100 and 120 unskilled employment opportunities will be created during the construction phase. During the operational phase, approximately 5 skilled and 7 unskilled employment opportunities will be created over the 20 year lifespan of the proposed facilities. • No additional opportunities for skills transfer and education/training of local communities created. 	<ul style="list-style-type: none"> • There will be no development of solar energy facilities at the proposed locations. • The agricultural land use will remain. • The current landscape character will not be altered by a solar energy facility and electrical infrastructure such as transmission lines. • No fragmentation of habitat or disturbance to faunal species. • No threatened vegetation will be disturbed or removed. • No additional water use associated with the construction phase and for the cleaning of panels and maintenance during the operational phase. • No increase in traffic associated with the construction phase. • No impacts associated with the construction phase will occur, i.e. dust generation, noise and littering. • No influx of people (mainly job-seekers) driven by the development of a solar energy facility will occur, which entails that there would not be additional pressures on the infrastructure and service delivery of local municipalities and towns in the area.

<ul style="list-style-type: none"> • Potential 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. • The local economic benefits associated with the REIPPPP will not be realised, and socio-economic contribution payments into the local community trust will not be realised. 	
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The country is facing serious power and water shortages due to its heavy dependency on fossil fuels such as coal. There is therefore a need for additional electricity generation options to be developed throughout the country. As discussed in Chapter 1 of the EIA Report the main purpose of the proposed Solar PV Facility is to feed electricity generated by a renewable energy resource into the national electricity grid. Many other socio-economic and environmental benefits will result from the development of this project such as development of renewable energy resources in the country and contribution to the increase of energy security, employment creation and local economic development (as noted above).

In summary, whilst the “no-go” alternative will not directly drive any negative environmental and social impacts; it will also not result in any positive community development or socio-economic benefits. Furthermore, it will also 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. **Based on the above, the “no-go” alternative is not a preferred alternative.**

5.1.2. Land-use Alternatives

5.1.2.1. Agriculture

The proposed site is zoned for agricultural land-use at present, and is mainly used for livestock grazing. As noted in Chapter 3 of this EIA Report, agricultural potential is uniformly low across the preferred and alternative sites and the choice of placement of the proposed facility on the farm therefore has minimal influence on the significance of agricultural impacts. No agriculturally sensitive areas occur within the sites. A Soils and Agricultural Potential Assessment was conducted during the EIA Phase in order to assess the potential impacts of the proposed development on the soils and agricultural potential (Chapter 11). As indicated in the Soils and Agricultural Potential Assessment, none of the potential impacts identified have been rated with a high significance with the implementation of mitigation measures. The loss of agricultural land is rated as low with mitigation. It is important to re-iterate that the economic benefits to the farmer associated with the proposed Solar PV Facility are likely to be more significant than that of the current agricultural activities on site and these two land uses (agriculture and renewable energy generation) can potentially both be undertaken on site. This aspect is also addressed in the Soils and Agricultural Potential Assessment. **Hence, the sole use of the land for agriculture is not a preferred alternative.**

5.1.2.2. Alternatives for the generation of electricity from Renewable Energy Resources

Where the “activity” is the generation of electricity, possible reasonable and feasible alternatives for the generation of electricity from renewable energy resources for the proposed sites include Biomass, Hydro Energy and Wind Energy. However, based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies are deemed to be appropriate for the site. The unsuitability of other renewable energy developments for the site is discussed below.

▪ Biomass Energy

The proposed project site lacks any abundant or sustainable supply of biomass. According to the South African Renewable Energy Resource Database (SARERD), the project site is identified as having no cumulative biomass energy potential (as shown in Figure 5.1). Certain areas within the KwaZulu-Natal

province, for example, have a good biomass energy potential ranging between 101 GJ/ha/year and 500 GJ/ha/year (as shown in Figure 5.1). However, based on the SARERD, the implementation of a Biomass Facility at the proposed site in the Northern Cape **is therefore considered not a feasible and reasonable alternative** to the implementation of the proposed Solar PV Energy Facility.

▪ **Hydro Energy**

The proposed project site lacks any large inland water bodies, which precludes the possibility of renewable energy from small/large scale hydro generation. In terms of micro hydro power potential, the SARERD has classified the proposed project site as “Not Suitable” (as shown in Figure 5.2). The SARERD classifies certain areas within the Western Cape and the Drakensberg as having an excellent micro hydro power potential. However, based on the SARERD, the implementation of a Hydro Energy Facility at the proposed site is therefore also considered to be an unfeasible and unreasonable alternative to the implementation of the proposed Solar PV Energy Facilities. The climate in the area is hot, dry and arid, and the scarcity of water in the area is a major challenge. **The construction and operation of a hydro energy facility on the proposed project site is therefore considered not to be a feasible or reasonable alternative** to the implementation of the proposed solar PV energy facility.

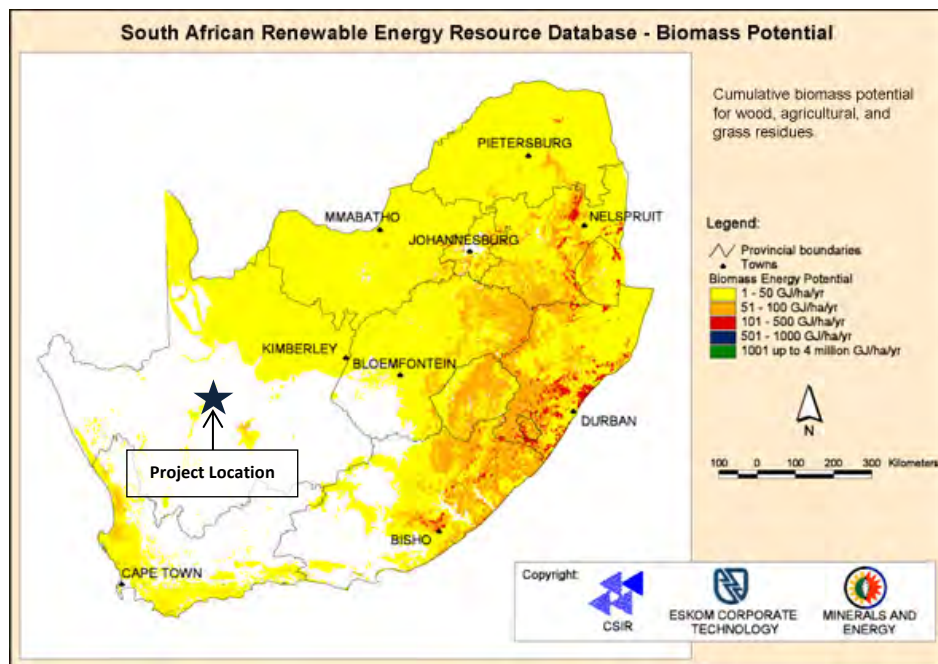


Figure 5.1: Biomass Potential (Source: SARERD)

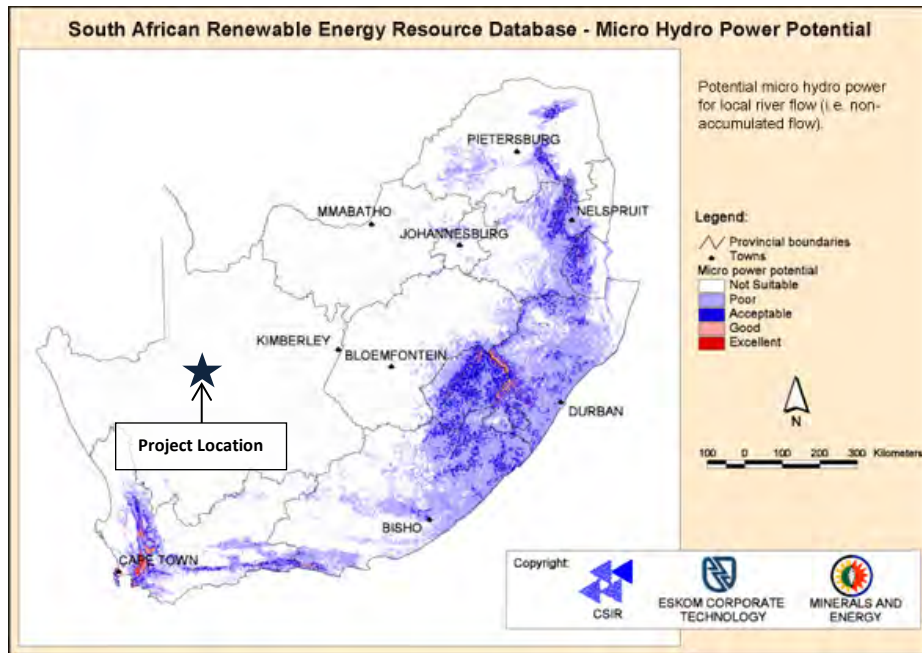


Figure 5.2: Micro Hydro Power Potential (Source: SARERD)

▪ Wind Energy

Wind energy is considered to be the most feasible alternative to solar energy when compared to biomass and hydro energy; however the site specific requirements of wind energy facilities make it a less feasible alternative when compared to solar PV. In order to ensure that a wind energy facility is successful, a reliable wind resource is required. A wind resource is defined in terms of average wind speed, turbulence, and direction. Measurements provided by the Wind Atlas of South Africa (WASA) indicate that the mean wind speed is the highest at the coastal regions of South Africa (as shown in Figure 5.3), **making wind energy an unfeasible or unreasonable alternative for the proposed project area** in the Northern Cape province when compared to the availability of solar radiation resources.

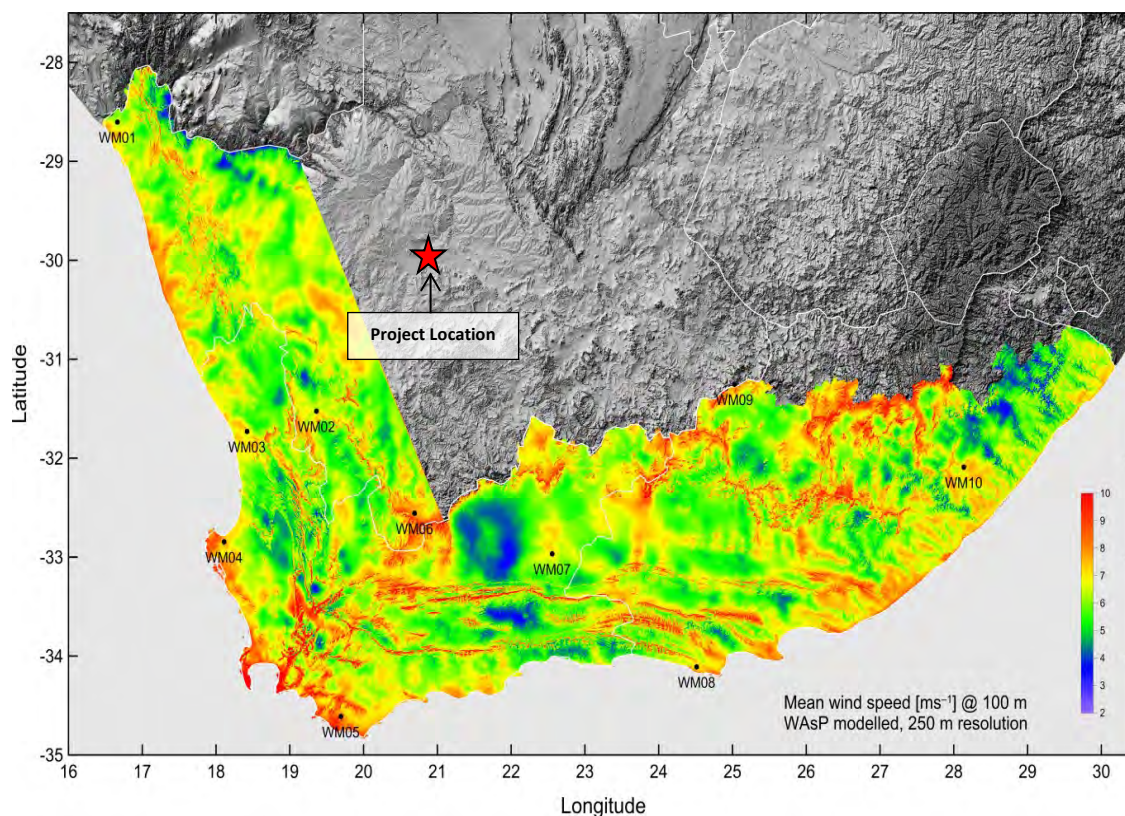


Figure 5.3: Representation of Mean Wind Speed (ms^{-1} at 100 m) (Source: WASA, 2014)

▪ Solar Energy

• National Level Considerations: Solar Radiation

The north-western part of South Africa has the highest Global Horizontal Irradiation¹ (GHI), relevant to PV installations (Figure 5.4) and Direct Normal Irradiance² (DNI), relevant to CPV and tracking PV installations (Figure 5.5). Therefore, this section of South Africa is deemed 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 KwaZulu-Natal, Eastern Cape and Western Cape mainly have a solar radiation between 1 500 kWh/m^2 and 1 700 kWh/m^2 per annum, which is not completely feasible for the proposed projects. On the other hand, the Northern Cape (the area with the predominant pink shading in Figure 5.4) has a solar radiation of 2 300 kWh/m^2 per annum, which is the highest level. Various developers have received several approvals for Solar PV Facilities on farms in the Northern Cape, which shows and justifies the suitability of this area for this type of development. **Therefore, the area proposed for the project is deemed the most suitable for the construction and operation of a solar energy facility.**

¹ Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground

² Direct Normal Irradiance is the amount of solar radiation received per unit area by a surface that is always held perpendicular (or normal) to the rays that come in a straight line from the direction of the sun at its current position in the sky.

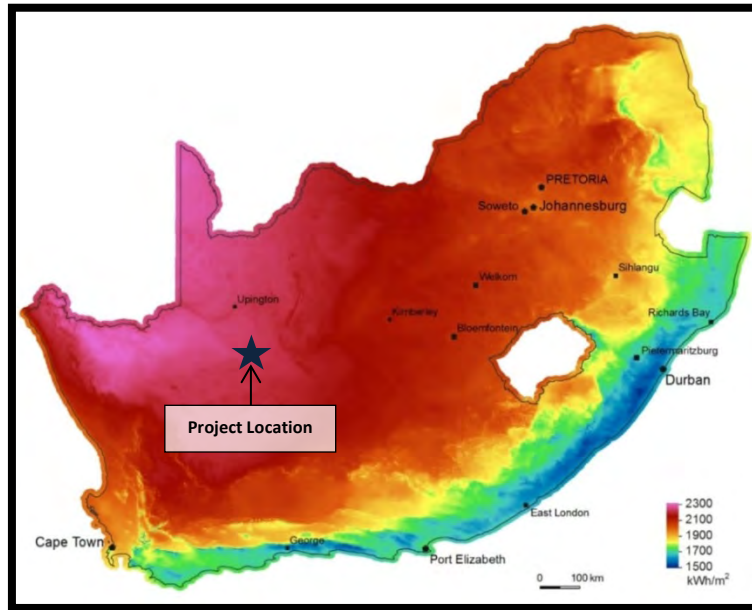


Figure 5.4: Solar Resource Availability in South Africa (Source: SolarGIS map© 2013 GeoModel Solar).

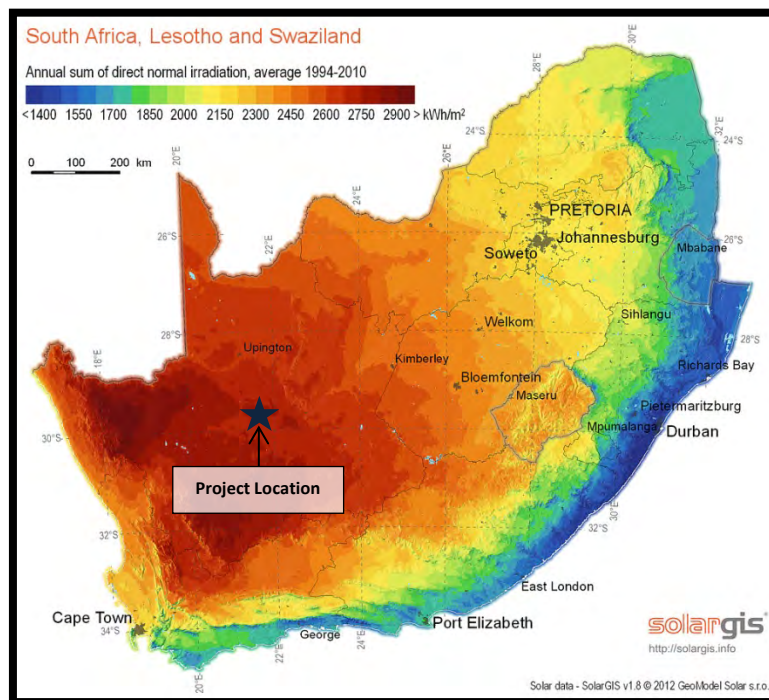


Figure 5.5: Direct Normal Irradiation of South Africa (Source: SolarGIS map© 2014 GeoModel Solar).

- *Renewable Energy Independent Power Producer Programme and Strategic Environmental Assessment for Wind and Solar PV in South Africa*

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as “IRP2010”) and the IRP Updated Report (2013) proposes to secure 17 800 MW of renewable energy capacity by 2030. The DoE subsequently has entered into a bidding process for the procurement of 3 725 MW of renewable energy from IPPs by 2016 and beyond to enable the Department to meet this target. 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 Government Gazette 39111. The additional target allocated for wind energy, Solar PV Energy, and Solar CSP energy is 3 040 MW, 2 200 MW, and 600 MW respectively.

In order to submit a bid, the proponent is required to have obtained an EA in terms of the EIA Regulations as well as several additional authorisations or consents. It has been determined that even though the current processes will enable renewable energy to be fed into the national grid, the REIPPPP does have certain inefficiencies. As noted in Chapter 1 of this EIA Report, to this end, the National DEA, in discussion with the DoE, has been mandated by MinMec to undertake a SEA³ to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Wind and Solar PV SEAs are in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. The SEAs aim 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 SEAs is 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 access⁴. Following the completion of the SEAs, the proposed REDZs, shown in Figure 5.6, were submitted for Cabinet approval for the rollout of Solar PV Energy in the Northern Cape, Eastern Cape, Western Cape, Free State and North West provinces.

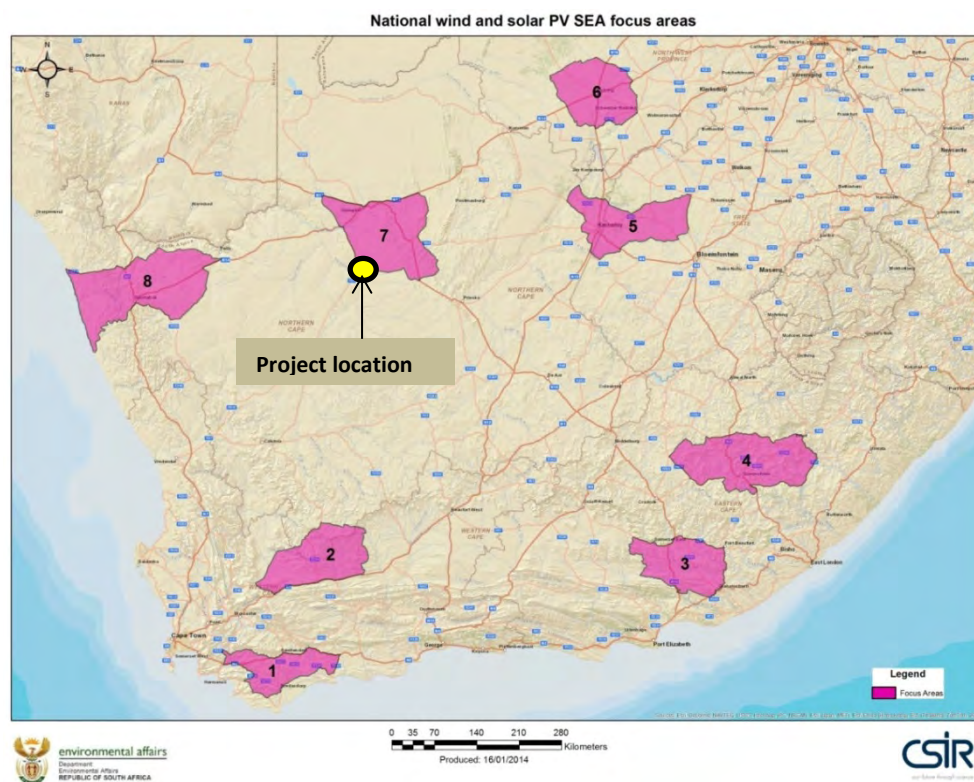


Figure 5.6: Renewable Energy Development Zones (REDZs) identified in the Solar Strategic Environmental Assessment (SEA). The proposed solar project falls within REDZ 7: Upington [REDZ 1: Overberg; REDZ 2: Kromberg; REDZ 3: Cookhouse; REDZ 4: Stormberg; REDZ 5: Kimberley; REDZ 6: Vryburg; REDZ 7: Upington; REDZ 8: Springbok]

As previously noted, the proposed Solar PV Facility currently falls within the REDZ 7 (Upington). The proposed project is therefore in line with the criteria of the Solar SEA and located in an area of strategic

³ Information on this process can be obtained at: <http://www.csir.co.za/nationalwindsolaresea/background.html>

⁴ More information on the SEA can be read at <https://redzs.csir.co.za/>

importance for Solar PV development. It should be noted that even if a project falls within a REDZ, the proposed development still requires site specific assessments as per the site protocol in order to determine the potential impacts of a project at a local and site specific level.

In conclusion, **the implementation of a solar energy facility at the proposed project site is more favourable and feasible than any other alternative for generating 20 MW or more from a renewable energy resource.** Therefore in terms of project and location compatibility, the proposed solar facility is considered to be the most feasible land use alternative. Since these alternative land-uses were deemed unsuitable for the area and the preferred sites, these technologies were not further assessed during the EIA Phase. Only solar energy was assessed during the EIA Phase. Furthermore, it is important to note that solar energy development (i.e. not wind energy, hydro power and biomass) is the Project Applicant’s core business area and focus. The experience of the Project Applicant within the solar energy development industry will positively benefit the proposed project. Furthermore, from an impact and risk assessment perspective, the implementation of a Solar PV Facility on the proposed site will result in fewer risks and impacts of low significance in comparison to the implementation of wind energy, hydro power and biomass. The risks and impacts are described in Table 5.2 below.

Table 5.2: Evaluation matrix of alternatives for generation of electricity from a renewable resource, taking into account resource, strategic alignment and potential risks and impacts.

Type of Renewable Energy	Are suitable resources available at the proposed project site?	Strategic Alignment	Preferred Alternative?	Main potential risks and negative impacts	Preferred alternative?
Biomass Energy	No (Low – 1-50 GJ/ha/yr)	No	x	Waste generation (especially waste water during operation), air emissions, traffic impacts (due to the transport of material (“biomass”) to the site)	x
Hydro Energy	No (Not Suitable)	No	x	Not suitable due to the water limitations in the area	x
Wind Energy	No	No	x	Bigger footprint resulting in more impacts: Visual, noise, land transformation (land-use change and vegetation clearing), bird and bat collisions, impact on watercourses	x
Solar Energy	Yes (High – 2100 kWh/m2/yr)	Yes (REDZ 7)	✓	Visual, land transformation (land-use change and vegetation clearing)	✓

5.1.3. Technology Alternatives

5.1.3.1. Solar Panel Types

The main differences between PV and Concentrated Solar Power (CSP) that led to the selection of PV as the preferred solar panel technology by the Project Applicant are water requirements and impacts on

potential sensitive visual receptors, physical development footprints and potential project development costs (Table 5.3). Furthermore, Government Gazette 39111 published on 18 August 2015, has indicated that no additional procurement target was allocated for CPV (South Africa, 2015) which means that the need and desirability of CSP is not as evident and justified compared to PV. Based on these factors, only the PV solar panel technology type was considered during the EIA Phase.

Table 5.3: Main differences between Photovoltaic and Concentrated Solar Power technologies considered in selecting Photovoltaic as the preferred solar panel type.

Photovoltaic	Concentrated Solar Power
Absorbs sunlight to generate energy	Reflects and concentrates sunlight to heat a substance which generates energy
Low reflectivity – low visual impact	High reflectivity – high visual impact
Less water required – only needed for panel maintenance and cleaning	More water required – water required for cooling during the actual operation if the facility, as well as maintenance and cleaning purposes
Smaller footprint requirements	Larger footprint requirements
Solar tracking infrastructure optional	Solar tracking infrastructure required

5.1.3.2. Mounting and Tracking System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The mounting system alternatives that were considered in the Scoping phase are:

- Horizontal Single Axis Tracking (aligned north-south);
- Dual Axis Tracking;
- Fixed Axis (aligned east-west); and
- Fixed Tilt Mounting Structure.

Of the above mentioned alternatives, the preferred alternatives are the **Horizontal Single Axis Tracking System** and the **Fixed Axis Mounting Structure** based on the best performing option in terms of energy production and costs/efficiency). Mountings are either rammed in the ground or where conditions are too hard, predrilling is done, backfilled, compacted and rammed. These alternatives were taken forward into the EIA Phase.

5.1.4. Site Alternatives

As noted above, the Scoping Report included information regarding how the preferred site was determined through a site selection process. Within this context, it is assumed that the “site” referred to in the 2014 EIA Regulations is the farm or land portion on which proposed location alternatives will be considered for the proposed project/s (discussed in Section 5.1.4 below).

As discussed in Chapter 1 of this EIA Report, as well as Section 5.1.2 above, the preferred site within the Northern Cape was selected based on national level considerations (high solar radiation in the Northern Cape, as opposed to other provinces within South Africa) and the fact that the proposed site currently falls within the REDZ 7. On a site specific (local) level, the site was deemed suitable due to all the site selection factors (such as land availability, sufficient land development area for this project as well as for the other adjacent six solar PV projects proposed for the Nieuwehoop Phase 2 Solar Development, distance to the national grid, site accessibility, topography, fire risk, current land use and landowner willingness) being favourable. The site selection criteria considered by the Applicant are discussed in detail below.

5.1.4.1. Site Specific Considerations

On a local (site specific) level, the site selection process took into account the following factors shown in Table 5.4.

Table 5.4 Site selection factors and suitability of the preferred project site for Boven Solar PV4 on the Remaining extent of Boven Rugzeer Farm 169 near Kenhardt

FACTOR	SUITABILITY OF THE SITE
Land Availability	The Remaining Extent of Boven Rugzeer is of a suitable size for the proposed Solar PV Facility. The land available to develop at the preferred site comprises approximately 7 220 ha, (the project area of the facility comprises approximately 284 ha) however only approximately 220 ha will be required for the proposed project.
Irradiation Levels	2 100 – 2 300 kWh/m ² (i.e.very good)
Distance to the grid	An Environmental Authorisation for the construction of the 400/50 50 kV Eskom Nieuwehoop Substation was granted to Eskom Holdings SOC Limited on 21 February 2011 by the DEA (Reference Number: 12/12/20/1166). Site preparation and construction of the substation has commenced and is currently underway. An Environmental Authorisation (DEA Reference Number: 12/12/20/2606; NEAS Reference Number: DEA/EIA/0000785/2011), dated 14 February 2014, was also granted to Eskom Holdings SOC Limited to construct, inter alia, the following within the existing development footprint of the Nieuwehoop Substation: <ul style="list-style-type: none"> - 2 x 400 kV transformer feeder bay; - A 400 / 132 kV transformer; - 132 kV busbar; - 400 / 132 kV 500 MVA x 3 transformers; and - 8 x 132 kV feeder bays and associated lines. <p>The proposed project will be located approximately 9 km from the Eskom Nieuwehoop Substation (see Figure 5.7).</p>
Site Accessibility	The proposed project site can be accessed via the existing Transnet Service Road (private) or an unnamed farm road. The Transnet Service Road can be accessed from the R27 and the unnamed farm road can be accessed via the R383. An internal gravel road/s may be constructed from the Transnet Service Road or the unnamed farm road to the preferred site.
Topography	Slope ≤2% (Level to very gentle slope).
Fire Risk	Main vegetation type is Bushman arid grassland, low fire risk.
Current Land Use	Agriculture - Grazing

Furthermore, from an impact and risk assessment perspective, the implementation of Solar PV Facility on the Remaining Extent of Boven Rugzeer Farm 169 will result in fewer risks in comparison to its implementation at alternate sites that were considered during the Scoping Phase within the Northern Cape (i.e. regions with similar irradiation levels). The following risks and impacts will be likely in this case:

- There is no guarantee that suitable land will be available for development of a Solar PV Facility/ies. Site geotechnical conditions, topography, fire potential and ready access to a site/s might not be suitable, thus resulting in negative environmental implications and reduced financial viability.
- There is no guarantee that the current land use of alternative sites (that were considered during the Scoping Phase) will be flexible in terms of development potential, for example the agricultural potential for 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/s will not be feasible.

- There is no guarantee that other sites within the Northern Cape will be located close to existing or proposed electrical infrastructure to enable connection to the national grid. The further a project is located from the grid, the higher the potential for significant environmental and economic impacts.

As previously noted, the proposed Boven PV4 facility forms part of a bigger project by Mulilo Renewable Project Developments (PTY) LTD to develop seven Solar PV Facilities in total as part of their Phase 2 development near Kenhardt. The main driver for Mulilo was to find suitable, developable land in one contiguous block to optimise design, minimise costs, minimise sprawling development and impact footprints and that located close to the Nieuwehoop substation.

Given the site selection requirements associated with Solar Energy Facilities and the suitability of the land available on the Remaining Extent of Boven Rugzeer Farm 169, no other site alternatives have been considered in the EIA Phase.

5.1.5. Location Alternatives

Figure 5.7 shows the location alternatives that were initially considered by the Applicant during the Scoping Phase, as well as the preferred sites (that are assessed as part of the EIA). Figure 5.7 also shows the electrical infrastructure corridor (within which the transmission lines will be constructed to support the Solar PV project, which was also assessed as part of the EIA. The alternative site (assessed during the Scoping Phase) and the preferred site are suitable in terms of size requirements, i.e. larger than 220 ha which is required for the proposed Boven Solar PV4 Facility and still falls within the boundaries of the Remaining extent of Boven Rugzeer Farm 169 which, as discussed above, has been deemed a suitable site for the proposed development.

The proximity of the two site locations (preferred and alternative) for the Boven Solar PV4 project to the Nieuwehoop Substation (currently being constructed) was the main consideration in terms of technical and economic feasibility of what the preferred site is. Based on a desktop assessment undertaken to identify and compare the sensitivities on the preferred Boven Solar PV4 site and the Boven Solar PV4 Alternative sites (discussed in Table 5.5), both site localities are expected to be fairly homogenous in terms of environmental features on site and should there be features present within a specific site boundary, it can be avoided by the layout and design of the project (to be determined during the EIA Phase). The sensitive environmental features found within the preferred site, as described in the specialist studies (Chapters 7 to 14 of this EIA Report) and discussed in the conclusions chapter of this EIA Report (Chapter 17) are able to be avoided by the location, layout and design of the project. A site layout is provided in Chapter 17, which avoids all the environmental sensitivities determined on site.

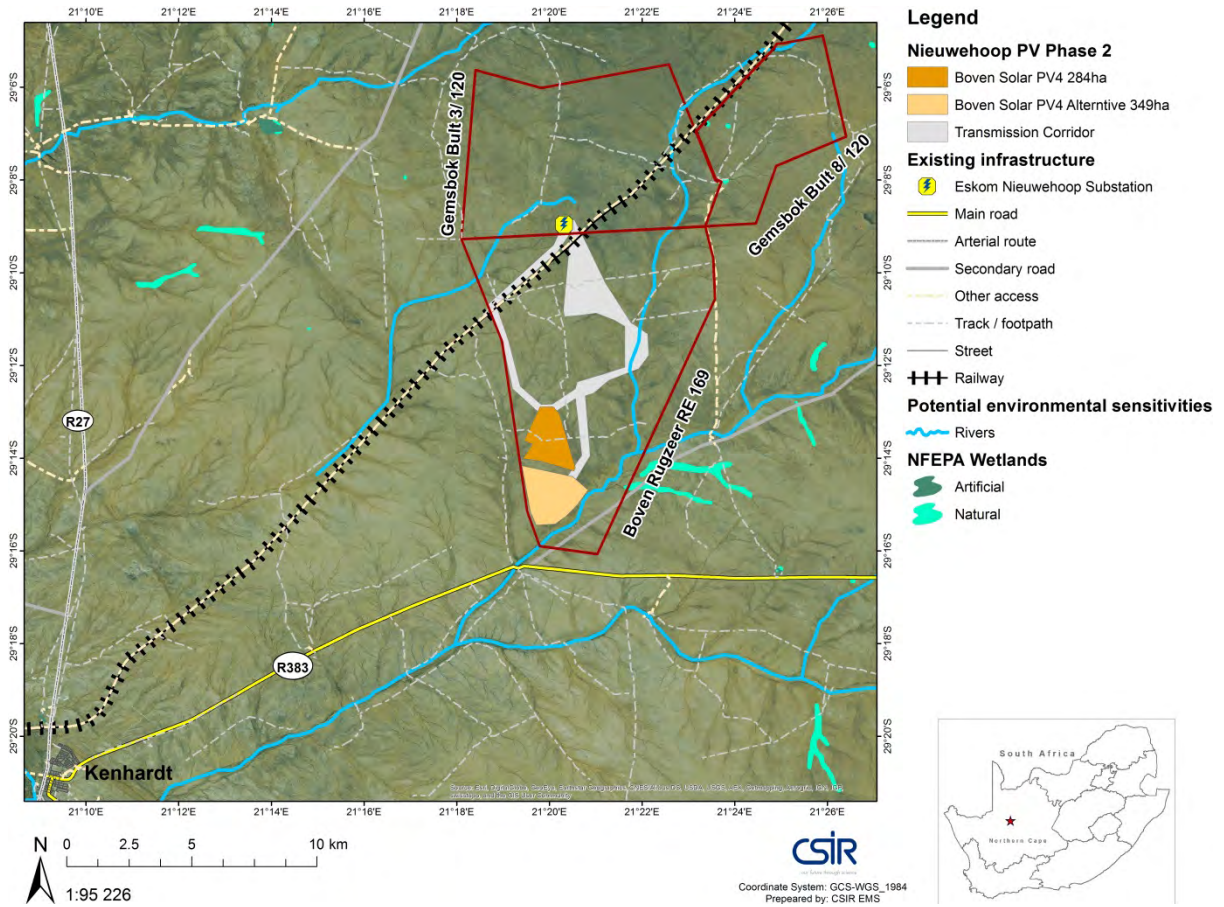


Figure 5.7: Location Alternatives on the Remaining Extent of Boven Ruzzeer Farm 169 that were initially considered by the Applicant.

Table 5.5: Comparison (site selection matrix) of environmental attributes and sensitivities of the Boven Solar PV4 and Boven Solar PV4 Alternative sites as identified in the Scoping Report (CSIR, 2015)

Environmental Attributes	Comparison of environmental attributes and potential impacts associated with Boven Solar PV4 and Boven Solar PV4 Alternative project sites
Visual	The preferred site for this facility will require a shorter transmission line to connect to the Eskom grid at the Nieuwehoop Substation than the alternative site. It is also located further from the R383 road to Kenhardt and is likely to affect motorists using this road less than a facility on the alternative site. There are very few sensitive visual receptors in the surrounding landscape. The visual specialist confirmed that both sites are suitable for development in terms of visual impacts and can be taken forward into the EIA phase.
Heritage and Culture	There are no pans on the preferred or alternative sites for Boven Solar PV4, but there is one immediately outside the edge of the preferred site for Boven Solar PV4. This area should be avoided. There are no fatal flaws and it is recommended that both sites are suitable for development in terms of heritage. Significant impacts to heritage resources are likely to be limited to archaeological resources but at the same time such resources may be easily avoided by the final layouts. The Heritage specialist confirmed that both sites are suitable for development in terms of Heritage impacts can be taken forward into the EIA Phase.
Ecology	There are no pans on the preferred or alternative sites for Boven Solar PV4, but there is one immediately outside the edge of the preferred site for Boven Solar PV4. This area should be avoided. The area available to develop at the preferred Boven Solar PV4 Facility site is sufficient (i.e. approximately 284 ha vs 220 ha required for a solar PV facility). There is therefore scope to avoid any potential sensitive ecological features within the preferred project site. Several watercourses are present in the area investigated and is considered to be sensitive. These areas must be avoided. The vegetation on both sites, although untransformed, falls within a Least Threatened vegetation type, i.e. Bushmanland Arid Grassland. The preferred site is not located within close proximity of bird flyways that could disrupt the dispersal of birds or could increase bird mortalities (the alternative site is). Based on a number of aspects including surface area, sensitive habitat, occurrence of drainage lines, and location near important flyways, the Ecologist confirmed that the preferred Boven Solar PV4 is more favourable for development in terms of ecological impacts and can be taken forward into the EIA phase.
Socio-Economic	The two sites will have similar positive socio-economic impacts in terms of job creation, skills development of locals and impact on the local economy. It will also have similar negative impacts e.g. influx of job seekers; increase in social deviance and increase in incidence of HIV/AIDS infections. The socio-economic specialist confirmed that both sites are suitable for development in terms of socio-economic impacts and can be taken forward into the EIA phase.
Agriculture	Agricultural potential is uniformly low across both sites and the choice of placement of the facility on the Boven Solar PV4 or Boven Solar PV4 Alternative site has minimal influence on the significance of agricultural impacts. No agriculturally sensitive areas occur within the sites. The Soil/Agricultural Specialist confirmed that both sites are suitable for development in terms of soil or agricultural impacts and can be taken forward into the EIA phase.

Table 5.5 shows that both site localities are fairly homogenous in terms of environmental features on site. However, the **Boven Solar PV4 site** is favoured for the proposed project based on the following (see also site selection matrix in Table 5.6):

- The preferred Boven Solar PV4 site will require a shorter transmission line to connect to the Eskom grid at the Nieuwehoop Substation than the alternative site. This would lead to a more cost effective and optimised project.
- The preferred Boven Solar PV4 site is also located further from the R383 road to Kenhardt and is likely to affect motorists using this road less than a facility on the alternative site.

Table 5.6: Comparison (site selection matrix) of aspects of the Boven Solar PV4 and Boven Solar PV4 Alternative sites

Site considered	Geotechnical and topography	Proximity to the grid	Proximity to Sishen railway line	Environmental	Preferred?
Boven Solar PV4	Suitable	✓	✓	✓	✓
Boven Solar PV4 Alternative	Suitable	x	x (closer)	x (close to pans)	x

The preferred project area includes approximately 284 ha of land. The proposed project only requires approximately 220 ha of land; therefore there is scope to avoid major environmental constraints through the final design of the facility. During the EIA Phase, the specialists have identified sensitive features on the preferred site. As a result, the final siting of the proposed facility on the preferred site is discussed in Chapter 17 of this EIA Report, whereby the sensitive features identified were avoided by the proposed layout, based on specialist recommendations.

As noted in Chapter 1 of this EIA Report, the 2014 EIA Regulations (Appendix 3 of the GN R982) have certain requirements in terms of the selection of the preferred site location for the proposed activity. Table 5.7 below indicates the requirements of the 2014 EIA Regulations in terms of the process leading to the preferred site and location alternatives. Table 5.7 also includes a response from the EAP showing how the requirements of the 2014 EIA Regulations have been addressed in this report.

Table 5.7: Requirements for the consideration of Alternatives in the EIA Phase

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
1.	Appendix 3 – (2)	The objective of the EIA Process is to, through a consultative process:	Refer to responses below.
2.	Appendix 3 – (2) (c)	<ul style="list-style-type: none"> ▪ identify the location of the <u>development footprint within the preferred site</u> 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. 	<p>As noted in the preceding chapters of this EIA Report, the preferred site for the proposed Boven Solar PV4 project extends approximately 284 ha. However, the proposed solar facility and associated infrastructure requires a development area of approximately 220 ha. To assess the worst case scenario, the larger area was considered and assessed by the specialists in order to ensure that any development constraints or environmental sensitivities can be avoided in the final siting and location of the proposed facility. This is discussed further in Chapter 17 of this EIA Report, which includes an environmental sensitivity map that was produced based on the input obtained from the various specialist studies (mainly the Ecological Impact Assessment and Heritage Impact Assessment). The significant environmental features identified by the relevant specialists have been mapped and overlain by the Boven Solar PV4 area (of approximately 284 ha). The buffers and exclusion areas that need to be applied to the sensitive areas (as identified in the specialist studies, e.g. 32 m from major watercourses) have also been mapped and overlain by the Boven Solar PV4 project area. The remaining areas outside of the sensitive areas and buffers are then regarded as the areas available for development (i.e. the Development Envelope). Therefore, a suitable layout within the Development Envelope for the 220 ha site has been determined and prepared (discussed in Chapter 17), ensuring that the areas that have a high environmental sensitivity will be avoided and the required buffer zones be implemented by the proposed siting of the proposed PV facility. A single suitable location for the proposed 220 ha site has been identified based on the sensitivity mapping and the Development Envelope. Therefore, the overall impact of the proposed project on the sensitive features is expected to be low. Chapter 17 of this report includes a detailed discussion on the project layout and the Development Envelope of the project.</p> <p>As noted above, a worst case scenario was adopted by the specialists in terms of the area of assessment. The specialist studies included in Chapters 7 to 14 of this</p>

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
			EIA Report therefore include an impact assessment process (inclusive of cumulative impacts) and by default, a ranking process of the identified development footprint (i.e. the Development Envelope) focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.
3.	Appendix 3 – (2) (d)	<ul style="list-style-type: none"> ▪ 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. 	The specialist studies included in Chapters 7 to 14 of this EIA Report include a description and assessment of the nature, significance, consequence, extent, duration and probability of the identified impacts for the preferred alternatives. The specialist studies also include the 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.
4.	Appendix 3 – (2) (e)	<ul style="list-style-type: none"> ▪ identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment. 	Refer to the project layout map overlain by the sensitivity map in Chapter 17 as described in Point 2 above.
5.	Appendix 3 – (2) (f)	<ul style="list-style-type: none"> ▪ identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity. 	The specialist studies included in Chapters 7 to 14 of this EIA Report include a description, identification, assessment and ranking of identified impacts that the proposed Solar PV facility will impose on the preferred location of the proposed plant.
6.	Appendix 3 – (2) (g)	<ul style="list-style-type: none"> ▪ identify suitable measures to avoid, manage or mitigate identified impacts. 	The specialist studies included in Chapters 7 to 14 of this EIA Report include an identification of suitable measures to avoid, manage or mitigate identified impacts.
7.	Appendix 3 – (2) (h)	<ul style="list-style-type: none"> ▪ identify residual risks that need to be managed and monitored. 	The specialist studies included in Chapters 7 to 14 of this EIA Report include an identification of residual risks that need to be managed and monitored.
8.	Appendix 3 - (3)(h)	<p>A full description of the process followed to reach the proposed development footprint within the approved site, including -</p> <ul style="list-style-type: none"> ▪ (i) details of the development footprint alternatives considered; ▪ (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; 	Refer to the Development Envelope and sensitivity mapping approach described in Point 2 above. The layout map is provided in Chapter 17 to show the preferred development location within the approved site.

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
		<ul style="list-style-type: none"> ▪ (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; ▪ (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and ▪ (x) a concluding statement indicating the preferred alternative development location within the approved site. 	
9.	Appendix 3 – (3) (l)	An environmental impact statement which contains (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Refer to the Development Envelope and sensitivity mapping approach described in Point 2 above. Refer to environmental impact statement in Chapter 17.
10.	Appendix 3 – (3) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Refer to the Development Envelope and sensitivity mapping approach described in Point 2 above. The final proposed alternatives are included in Table 5.7.

5.1.6. Technology Alternatives

5.1.6.1. Solar Panel Types

Only the PV solar panel type is considered in during the EIA Phase. 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 was not be considered further. CSP technology also reflects and concentrates sunlight to heat a substance which generates energy, whereas PV technology absorbs sunlight to generate energy. CSP technology therefore has a high reflectivity (i.e. a higher visual impact) than PV technology. Furthermore, as noted above, in Government Gazette 39111 published on 18 August 2015, no additional procurement target was allocated for CPV. This means that the need and desirability of CSP is not as evident and justified compared to PV. Based on these factors, only the PV solar panel technology type has been considered in the EIA Phase.

5.1.6.2. Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The main mounting systems that will be considered as part of the design are:

- Horizontal Single axis tracking structures (aligned north-south); and
- Fixed axis structures (aligned east-west).

The above mounting structures were considered during the EIA Phase to inform the detailed design of the proposed Solar Facilities. Additional information regarding the mounting system is provided in Chapter 2 of this EIA Report.

5.1.7. Layout Alternatives

The findings of the specialist studies were used to inform the layout of the proposed facility within the preferred Boven Solar PV4 site. The specialist studies were conducted during the EIA Phase identified various environmental sensitivities present on the site that should be avoided. The specialists proposed buffers to avoid these sensitive areas, such as water courses on site. These buffers were applied by the applicant in the compilation of the project layout (as can be seen in Chapter 17 of this report).

5.2. Assessment of Potential Impacts (Scoping Level)

During the Scoping Phase, an assessment was undertaken by the CSIR to determine the nature, significance, consequence, extent, duration and probability of the potential impacts and risks identified for each of the location alternatives identified (i.e. the preferred Boven Solar PV4 and the alternative site). Refer to the finalised Scoping Report (CSIR, 2015) for the methodology adopted and the findings of the assessment.

The high-level Scoping Phase assessment concluded that the preferred site for the project is the Boven Solar PV4 site.

Note on impact and cumulative impact on the SKA (comment from the SKA office-see their letter included in Appendix G): Based on distance to the nearest SKA station (15 km), and the information currently available on the detailed design of the PV installation, a single photo-voltaic electricity

generation facility would pose a medium to high risk of detrimental impact on the SKA. However, multiple facilities, as is the case for this application, would result in an increase in the risk (to at least a high risk or extremely high risk) of detrimental impact on the SKA as a result of the integrated impact.

The medium to high to extremely high potential risk is noted. Mulilo Renewable Project Development (Pty) Ltd (Mulilo) has commissioned a Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI) study. As noted in Chapter 4 of this EIA Report, Mulilo appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of the proposed PV Projects in Astronomy Geographic Advantage (AGA) area. The study is included in Appendix J of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office will review the findings of this study and provide feedback during the EIA Phase.

5.3. Concluding Statement of Preferred Alternatives

Based on the aspects considered in this Chapter, the following preferred alternatives were considered in the EIA Phase:

Development of the “Boven Solar PV4” energy facility, using Horizontal Single Axis Tracking, Fixed Axis structures, on the preferred site, close to the Eskom Nieuwehoop substation, and the preferred location, Remaining Extent of Boven Rugzeer Farm 169. The final layout of Boven Solar PV4 was informed by specialist studies during the EIA phase to avoid environmental sensitivities as far as possible.

As per Appendix 2, Section 2 (xi) of the 2014 EIA Regulations, details on the alternatives that were taken forward into the EIA Phase are presented in Table 5.8.

Table 5.8: Evaluation matrix summarizing the selection of preferred project alternatives (no-go; land-use; technology; site; location; layout).

Alternative	Preferred alternative	Reasoning
<p>No-go alternative (with agriculture as current land-use) vs. Development of the Boven Solar PV4 Facility</p>	<p>✓ Development of the Boven Solar PV4 facility</p>	<ul style="list-style-type: none"> The “no-go” alternative will not directly drive any negative environmental and social impacts; it will also not result in any positive community development or socio-economic benefits. Furthermore, 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. Preliminary investigations indicate that the area is classified as non-arable and low potential grazing land. Development of the Boven Solar PV4 Facility was considered in the EIA Phase.
<p>Generation of 20 MW or more from a renewable source</p> <ul style="list-style-type: none"> Biomass energy Hydro-power Wind energy Solar power 	<p>✓ Solar power</p>	<ul style="list-style-type: none"> Insufficient biomass, hydro-power, and wind energy resources at the proposed project site. High solar radiation resource and strategically aligned by being located within REDZ 7. Only the Solar Power Land-Use (Renewable energy source) was assessed in the EIA Phase.
<p>Solar Panel Type Technologies</p> <ul style="list-style-type: none"> PV CSP 	<p>✓ PV</p>	<ul style="list-style-type: none"> PV technology poses less risk to the environment (visual, physical footprint, water use) and has lower cost implications for the developer. Only PV Solar Panel Type Technology was assessed in the EIA Phase.
<p>Mounting and Tracking Technologies</p> <ul style="list-style-type: none"> Horizontal Single axis tracking Fixed axis structures Dual axis tracking Fixed Tilt Mounting 	<p>✓ Horizontal Single Axis Tracking</p> <p>✓ Fixed Axis Structures</p>	<ul style="list-style-type: none"> Horizontal Single Axis Tracking and Fixed axis structures are the preferred alternatives based on the best performing option in terms of energy production and costs/efficiency. Only Horizontal Single Axis Tracking and Fixed Axis Structures were assessed in the EIA Phase.
<p>Site</p> <ul style="list-style-type: none"> Remaining Extent of Boven Rugzeer Farm 169 <p>Location</p> <ul style="list-style-type: none"> Boven Solar PV4 and Boven Solar PV4 Alternative 	<p>✓ Remaining Extent of Boven Rugzeer Farm 169 and</p> <p>✓ Boven Solar PV4</p>	<ul style="list-style-type: none"> The preferred location is suitable for the proposed development in terms of site selection requirements associated with solar energy facility. The Remaining Extent of Boven Rugzeer farm 169 is of a suitable size for the proposed Solar PV Facility. The land available to develop at the farm comprises approximately 7 220 ha, (the project area of the facility comprises approximately 284 ha), however only approximately 220 ha will be required for the proposed project. Boven Solar PV4 is located approximately 9 km from the Eskom Nieuwehoop Substation. The location and site are suitable as it falls within the available developable land for the development of the proposed seven Solar PV Facilities for Mulilo in one contiguous block or project area to optimise design, minimise costs, and minimise sprawling development and impact footprints.

Alternative	Preferred alternative	Reasoning
		<ul style="list-style-type: none"> No environmentally sensitive features have been identified on the preferred Boven Solar PV4 site which deems it unsuitable for the development of the proposed solar PV facility. Only the Remaining Extent of Boven Rugzeer Farm 169 was assessed in the EIA Phase. Only Boven Solar PV4 was assessed in the EIA Phase.
Layout <ul style="list-style-type: none"> Boven Solar PV4 layout 	✓ Boven Solar PV4 layout	<ul style="list-style-type: none"> The layout was prepared (Chapter 17) based on the findings and recommendations in the specialist studies that were undertaken during the EIA phase. (The layout avoids environmental sensitivities). The use of the existing Transnet Service Road or the unnamed farm road was considered during the EIA Phase.



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 6:

Comments and Responses Trail

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6. ISSUES AND RESPONSES TRAIL 6-2

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FIGURES

Figure 6.1: Decision-making framework for identifying key issues for the EIA 6-4



6. ISSUES AND RESPONSES TRAIL

This chapter presents the comments that were raised by I&APs and Organs of State to date as part of the EIA for the proposed Boven Solar PV4 project near Kenhardt and the comments from the EAP and the Project Applicant thereto. These comments have been received during the preceding Scoping Phase, prior to the release of the EIA Report for comment. Some of the comments were received after the finalised Scoping Report was submitted to DEA for decision-making, and were therefore not included in the Scoping Report.

6.1 Identification of Issues

An important element of the EIA Process is to evaluate the issues raised through the interactions with authorities, the public, the specialists on the EIA team and the project proponent. In accordance with the philosophy of Integrated Environmental Management, it is important to focus the EIA on the key issues, such as those issues that are considered critical for decision-making on the EA.

To assist in the identification of key issues, a decision-making process is applied to the issues raised, based on the following criteria (Refer to Figure 7.1):

- Whether or not the issue falls within the scope and responsibility of the proposed project; and
- Whether or not sufficient information is available to respond to the issue raised without further specialist investigation.

As noted in the finalised Scoping Report (CSIR, 2015), issues were sourced by the EIA team from the following Scoping interactions:

- **Newspaper Advertisement** - In order to inform the public of the proposed project and invite members of the public to register as I&APs, and to inform the EAP about specific issues or interests in the proposed project, the seven Solar PV projects and associated EIA Processes were advertised in one local newspaper (i.e. "*Gemsbok*") on 9 September 2015 (the newspaper is dated 11 September, but it was distributed on 9 September 2015) during the Scoping Phase. A copy of the newspaper advertisement is included in Appendix D of this Scoping Report.
- **Email** - Issues were sent to the CSIR via email correspondence during the Project Initiation Phase (in response to the review of the BID) and during the 30-day review of the Scoping Report (which included Letter 2, Comment Form and an Executive Summary of the Scoping Report). Comments were received following the submission of the finalised Scoping Report to DEA for decision-making.
- **Comment Form** - issues submitted to the CSIR via the Comment and Registration Form that was provided with Letter 1 and the BID mailed to I&APs, and with Letter 2 mailed to I&APs.

Section 6.2 below provides a summary of the comments received following the release of the Scoping Report for the 30-day review period and comments received following the 30-day commenting period prior to the release of the EIA Report for comment. The comments have been grouped according to the following categories:

- EIA Process and Public Participation;
- Project Infrastructure (including Transmission lines and Roads);
- Impacts on SKA;
- Ecological impacts;
- Socio-economic issues;
- Comments from the national Department of Environmental Affairs; and
- Comments from the Department of Environment and Nature Conservation.

DEA approved the Scoping Report in a letter dated 29 January 2016 (see Appendix G). The comments that are included in this letter are included in the Issues and Responses Trail as well as the responses thereto.

Section 6.3 provides a summary of the comments received during the review period of the BID, prior to the release of the Scoping Report for the 30-day commenting. These comments are included in the Issues Trail in section 6.3, as well as in Appendix G and Appendix H of the EIA Report. The comments have been grouped according to the following categories:

- EIA Process and Public Participation,
- Project Infrastructure (including Transmission lines and Roads); and
- Socio-economic issues.

It must be noted that the comments raised by I&APs, stakeholders or Organs of State during the 30-day review of this EIA Report will also be included in this Comments and Responses Trail and suitable responses will be provided by the EIA Team, prior to submission of the finalised EIA Report to the DEA for decision-making. This complies with the requirement of Appendix 3 (3) (s) (ii) of the 2014 NEMA EIA Regulations which requires an undertaking under oath or affirmation by the EAP in relation to the inclusion of comments and inputs from stakeholders and I&APs.

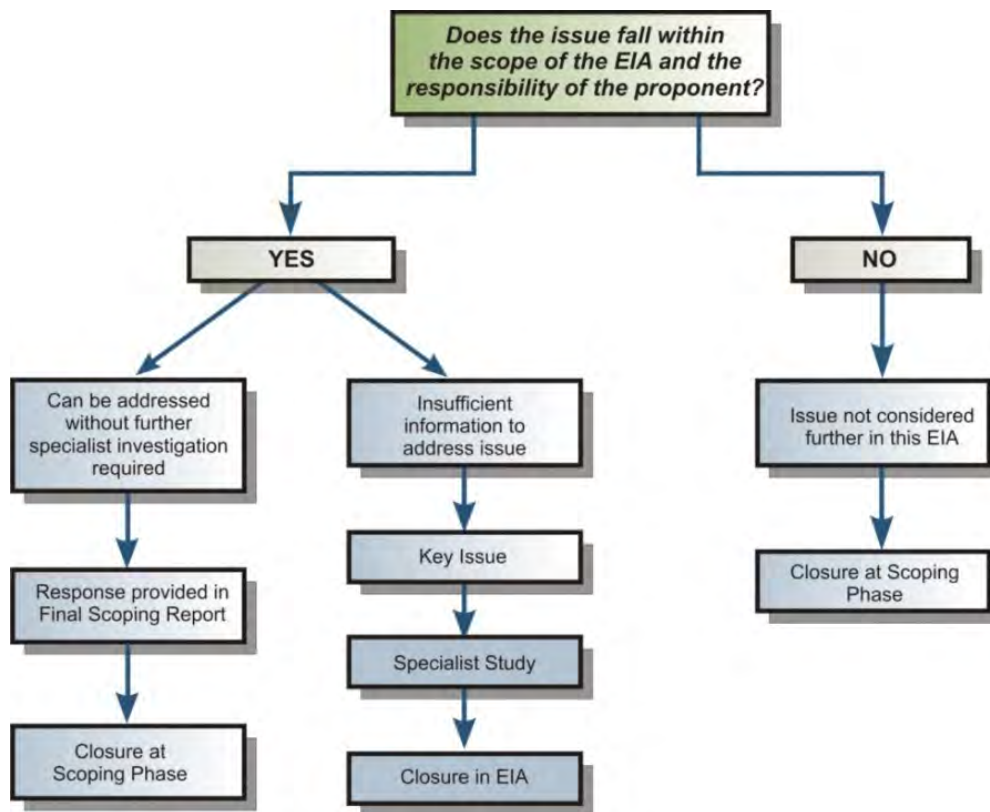


Figure 6.1: Decision-making framework for identifying key issues for the EIA

6.2 Issues and Responses Trail following the release of the Scoping Report for comment

The tables below summarise the issues raised after the release of the Scoping Report for I&AP review (i.e. following the release of the Scoping Report for comment), together with a responses from the EIA team. A synthesis of issues to be addressed in the Specialist Studies is provided in the Plan of Study for EIA (Chapter 8). The results of the Specialist Studies will be made available to I&APs for comment as part of the PPP undertaken for the EIA Report. Copies of the comments received are included in Appendix G and Appendix H (Notes from the meeting with DEA on 17 September 2015) of the Scoping Report.

1. EIA Process and Public Participation

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
1.1	The Department confirms having received the Scoping & EIA and X3 CD's for Environmental Authorisation of the above mentioned project on i.e Boven Solar PV4 the 05th November 2015. As required in terms of the Environmental Impact Assessment Regulations, 2014. The application has been assigned the reference number NC/NAT/ZFM/KEN/BOV3/2015. Kindly quote this reference number in any future correspondence in respect of the application. Please note the responsible officer is going to be Mr O. Riba and can be contacted on 0609914817	Ms. L. Tools-Bernado, Department of Environment & Nature Conservation	Letter dated 11/11/2015	CSIR: Comment noted. Mr Riba was subsequently added to the project database (Appendix C of this EIA Report).
1.2	Your notice received with regards to the Scoping Reports for the Proposed seven Solar PV projects near Kenhardt; Northern Cape is of reference. DWS requires you to forward hard copies of the above mentioned project to either of the following address: Physical Address: Department Of Water and Sanitation Louisvale Road Upington 8801 OR	Mei Melinda, Water Quality Management: Orange Proto CMA, Department of Water Affairs	27/10/2015, Email	CSIR: The Department of Water and Sanitation (DWS) was identified as a key stakeholder and thus included on the project database of I&APs and Organs of State at the outset of the Scoping and EIA Process. Refer to Appendix C of this EIA Report for a copy of the current database of I&APs. Hard copies and CD copies of the Scoping Reports including Letter 2, and a Comment and Registration Form, were sent to Ms. Melinda Mei of the Department of Water and Sanitation, at the following physical address: Louisvale Road, Upington, 8801. Letter 2, and the Comment and Registration Form were also sent to representatives of the DWS via email. Refer to

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>Postal Address: Department Of Water and Sanitation Private Bag X 5912 Upington 8800 Your co-operation and assistance is highly appreciated</p>			<p>Appendix E of this EIA Report for confirmation of the correspondence.</p> <p>Follow up responses were sent by the CSIR to Ms. Melinda Mei on 27 October 2015 informing the DWS of the provision of hard copies and CD copies of the Scoping Reports to the postal address she provided. This was done when the Scoping Report was released for comment. Refer to Appendix G of this EIA Report for a copy of this email response.</p>
1.3	<p>My contract with Eskom ended the end of February 2015, but I still need to keep an eye on my emails until December 2015. I will forward this information to the relevant person at Eskom. I am also actively busy with a lot of IPP work for different clients and thought maybe there are something I can help you with as well. I know the Eskom processes and most of the Transmission and Distribution team members. I attached my company profile for more information.</p>	Lindi Haarhoff, Eskom	26/10/2015, Email	<p>CSIR: Comment noted. Ms Lindi Haarhoff was taken off the project database. There are other representatives from Eskom on the database. They were provided with CD copies of the Scoping Reports, Letter 2, and a Comments and Responses Form. Comments were received from Mr John Geeringh at Eskom (see his comments in Appendix G).</p>
1.4	<p>Your enquiry regarding approval from the SACAA with regard to PV farms refers.</p> <p>There is a SACAA process whereby permission is applied for wrt obstacles which could pose an aviation hazard. More information can be obtained at http://www.caa.co.za. Click on information for industry 'Obstacles' on the LHS. Forms, Part 139-27 and submit on the form itself.</p> <ul style="list-style-type: none"> ▪ Kindly provide a .kml (Google Earth) file reflecting the footprint of the proposed development site including the proposed overhead electric power line route that will evacuate the generated power to the national grid. ▪ Also indicate the highest structure of the project & the overhead electric power transmission line. 	Lizelle Stroh, Obstacle Specialist, SACAA	26/10/2015, Email	<p>CSIR: Comments noted. The project applicant will submit the relevant application with the information requested to SACAA for approval. The requirements from SACAA will be adhered to.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<ul style="list-style-type: none"> ▪ Note that there may be other wind farms and PV farms in the area. Unique names are preferable. ▪ Please always use the proposed PV farm name in the Subject box when corresponding via email with this office and indicate the name & address which should appear on the CAA approval/decline letter. ▪ There is an assessment fee of R690 per application. ▪ For billing purposes: company name VAT nr. and postal details. ▪ Kindly ensure that all the above data is forwarded. Incomplete data causes unnecessary delays. <p>Note that the lead time for approval may take up to 90 days upon receipt of the correct data.</p>			
1.5	Solar Projects height and transmission propose layout and height.	Lizelle Stroh, Obstacle Specialist, SACAA	26/10/2015, Comment form, Email	CSIR: Comment noted. The project applicant will submit the relevant application with the information requested to SACAA for approval. The requirements from SACAA will be adhered to.

2. Project Infrastructure (including transmission lines and roads)

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
2.1	<p>Please find attached Eskom requirements for works at or near Eskom infrastructure (full document of Eskom requirements is attached in appendix G of this report).</p> <p>Note from the CSIR: The complete documents of Eskom requirements are attached in Appendix G of this report.</p>	John Geeringh (Pr Sci Nat), Senior Consultant Environmental Management, Eskom	27/10/2015, Email	<p>CSIR: Comment noted. The following documents were received from Mr. John Geeringh via email on 27 October 2015:</p> <ul style="list-style-type: none"> ▪ Eskom requirements for work in or near Eskom servitudes; and ▪ Renewable Energy Generation Plant Setbacks to Eskom Infrastructure.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				The abovementioned documents are included in Appendix G of this EIA Report, and have been sent to the Project Applicant for consideration in the design, where required and as applicable (i.e. in terms of work in or near Eskom servitudes and setback distances for Solar PV Facilities from power lines and substations).

3. Impacts on SKA

Note by CSIR: SKA provided comments on the Boven Solar PV Facilities (PV 2, 3 &4) within the same letter dated 2 December 2015. The letter is included in Appendix G of the EIA Report.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
3.1	This letter is in response to your email request, to provide an assessment on the potential development of four photo -voltaic electricity generation facilities in the Northern Cape Province and the risk they may pose on the Square Kilometre Array Project. A high level risk assessment has been conducted at the South African SKA Project Office to determine the potential impact of such facilities on the Square Kilometre Array. This letter serves to confirm the outcomes of the risk assessment, and proposals for any future investigations associated with this facility.	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/2015	Comment Noted.
3.2	The location of the proposed facility has been provided in the scoping report compiled by CSIR,	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/2015	Comment Noted.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
3.3	The nearest SKA station has been identified as SKA2360, at approximately 14 km from the proposed installation;	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/2015	Comment Noted.
3.4	Based on distance to the nearest SKA station, and the information currently available on the detailed design of the PV installation, a single photo-voltaic electricity generation facility would pose a medium to high risk of detrimental impact on the SKA. However, multiple facilities, as is the case for this application, would result in an increase in the risk (to at least a high risk or extremely high risk) of detrimental impact on the SKA as a result of the integrated impact.	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/2015	<ul style="list-style-type: none"> ▪ The medium to high to extremely high potential risk is noted. The distance of the proposed project to the nearest SKA station (i.e 15 km) has been included in Chapter 4 of this EIA Report. Mulilo Renewable Project Development (Pty) Ltd (Mulilo) has complied with the requirements from the SKA Project Office. A Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI) study has been commissioned by Mulilo. As noted in Chapter 4 of this EIA Report, Mulilo appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of the proposed PV Projects in Astronomy Geographic Advantage (AGA) area. The study is included in Appendix J of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office will review the findings of this study and provide feedback during the EIA Phase.
3.5	Any transmitters that are to be established, or have been established, at the site for the purposes of voice and data communication will be required to comply with the relevant AGA regulations concerning the restriction of use of the radio frequency spectrum that applies in the area concerned.	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/2015	All data and voice communication will comply with the relevant AGA Regulations.
3.6	As a result of the high risk associated with the PV facilities, the SKA project office recommends that further EMI and RFI detailed studies be conducted as significant mitigation measures would be required to lower the risk of detrimental impact to an acceptable level. Should a significant decrease in the risk not be achievable, the South African SKA Project Office will	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/2015	Detailed RFI and EMI studies were undertaken for the projects during the EIA phase. As noted in no 3.4 above, Mulilo appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of Proposed PV Projects in AGA Area, which is included in Appendix J of this EIA Report, with a summary provided in Chapter 17. The SKA Project Office will review the findings of this study and provide

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	not support the proposed establishment of these facilities;			feedback during the EIA Phase.
3.7	The South African SKA Project Office would like to be kept informed of progress with this project, and reserves the right to further risk assessments at a later stage.	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/ 2015	Comment Noted. As a registered Interested and Affected Party for the project the SKA office (in particular Mr Adrian Tiplady) will be kept informed of the progress of the project and the opportunities to comment. Mr Tiplady (SKA office) will be informed of the release of the EIA Report for a 30-day commenting period.
3.8	This technical advice is provided by the South African SKA Project Office on the basis of the protection requirements of the SKA in South Africa, and does not constitute legal approval of the renewable energy projects in terms of the Astronomy Geographic Advantage Act, the Management Authority, and its regulations or declarations	Dr. Andrian Tiplady, Head of Strategy, SKA South Africa	Letter dated 2/12/ 2015	Comment Noted.

4. Ecological Impacts

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
4.1	The proposed developer must comply with the following sections of the National Forest Act, Act 84 of 1998) (NFA), as alluded to on page 4-9 of the Scoping Report: Section 15(1): "No person may- (a) Cut, disturb, damage or destroy any protected tree; or (b) Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected trees, or any forest product derived from a protected tree except-	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 28/10/2015	Comment noted. The Project Applicant will comply with the provisions of the NFA.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	(i) Under a license granted by the Minister; or In terms of an exemption from the provision of this subsection published by the Minister in the gazette on the advice of Council”			
4.2	Section 62(2)(c): “Any person who contravenes the prohibition on (i) The cutting , disturbance, damage or destruction of temporarily protected trees or groups of trees referred to in section 14(2) or protected trees referred to in section 15(1)(a); or (ii) The possession, collection, removal, transport, export, purchase or sale of temporarily protected trees or groups of trees referred to in section 15(1)(b), or any forest product derived from a temporary protected trees, group of trees or protected tree, is guilty of a first category offence.	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 28/10/2015	Comment noted. The Project Applicant will comply with the provisions of the NFA. It should be noted that the project applicant has considered and applied buffer zones to the highly sensitive areas where the protected trees occur based on the recommendations from the specialist studies that were undertaken in the EIA phase. These sensitive areas will be avoided, or where it cannot be avoided the necessary permit will be obtained from the authorities for the removal and transplanting of the trees.
4.3	Section 58 (1) “ any person who is guilty of a first category offence referred to in section 62 and 63 may be sentenced to a fine or imprisonment for a period of up to three years, or both a fine and such imprisonment”	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 28/10/2015	Comment noted. The Project Applicant will comply with the provisions of the NFA.
4.4	Comments on Scoping Report summary: Kindly ensure that you assess the cumulative impacts on NFA listed protected tree species of the proposed seven (7) x 75 MW PV facilities and their associated infrastructure. The facilities should be placed where it would have the least impact on slow growing protected tree species.	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 28/10/2015	Comments noted. The cumulative impacts on NFA listed protected tree species were assessed in the Vegetation and Wetlands Specialist study (Chapter 8 of the EIA Report). The study includes a sensitivity map of sensitive ecological features that should be avoided (including NFA listed protected tree species such as <i>Boscia albitrunca</i>). The sensitivities as identified in the specialist studies (including the Vegetation and Wetlands study) were taken into consideration when the applicant prepared the site layout. The site layout therefore avoids these sensitive areas as can

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				be seen in the sensitivity maps included in Chapter 17 (Figures 17.2-1.7.4) and in the EMPr (Part B of this EIA Report). The proposed Solar PV Facility will therefore not be placed in areas where it will impact on slow growing protected tree species.
4.5	For land zoned for agriculture, the Sub-division of Agricultural Land Act 70 of 1970 may also be applicable, requiring inputs from the DAFF. Any land demarcated under the Act, thus agricultural land, cannot be changed to another land use without the supported recommendation under Act 70 of 1970. A local authority cannot change the zoning of demarcated agricultural land to any other zoning without a letter from the Registrar of this Act. The contact persons are: Ms. Mashudu Marubini (Delegate of the Minister for Act 70 of 1970, Mashuduma@daff.gov.za, tel (012) 319 7619); Ms. Thoko Buthelezi (AgriLand Liaison Office, ThokoB@daff.gov.za, tel (012) 319 7634 or Ms Hettie Buys Act 70/70 registry (HettieB@daff.gov.za).	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 28/10/2015	Comment noted. The project applicant will obtain the necessary letter from the Registrar and will contact the relevant contact persons as indicated in the letter from Ms Jacoline Mans.
4.6	Kindly ensure that you register the Forestry Office in Upington as commenting authority and supply copies (hardcopies or electronic) of the ecological impact assessment specialist report, as well as other relevant documentation, for commenting purposes.	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 28/10/2015	Comment noted. The Forestry Office in Upington is registered as an Interested and Affected Party on the project database (Refer to the project database in Appendix C). Copies of the EIA Reports (hard copies or CDs) will be supplied to this office for comment.
4.7	The proposed developer must comply with the following sections of the NFA, as alluded to on page 4-9 of the Scoping Report: Section 15(1): "No person may- (c) Cut, disturb, damage or destroy any protected tree; or	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and	Letter dated 01/12/2015	Comment noted. The Project Applicant will comply with the provisions of the NFA.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>(d) Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected trees, or any forest product derived from a protected tree except-</p> <p>(ii) Under a license granted by the Minister; or</p> <p>(iii) In terms of an exemption from the provision of this subsection published by the Minister in the gazette on the advice of Council”</p>	Fishery		
4.8	<p>Section 62(2)(c): “Any person who contravenes the prohibition on</p> <p>(i) The cutting , disturbance, damage or destruction of temporarily protected trees or groups of trees referred to in section 14(2) or protected trees referred to in section 15(1)(a); or</p> <p>(ii) The possession, collection, removal, transport, export, purchase or sale of temporarily protected trees or groups of trees referred to in section 15(1)(b), or any forest product derived from a temporary protected trees, group of trees or protected tree, is guilty of a first category offence.</p>	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 01/12/2015	Comment noted. The Project Applicant will comply with the provisions of the NFA.
4.9	<p>Section 58 (1) “ any person who is guilty of a first category offence referred to in section 62 and 63 may be sentenced to a fine or imprisonment for a period of up to three years, or both a fine and such imprisonment”</p>	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 01/12/2015	Comment noted. The Project Applicant will comply with the provisions of the NFA.
4.10	<p>Comments on Scoping Report: Comments on Scoping Report:</p>	Jacoline Mans, Chief Forester: NFA	Letter dated 01/12/2015	Comments noted. As noted under comment no 4.4, a Vegetation and Wetlands Impact Assessment study has been

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>Page 4 of the Scoping Report indicated that the project area of the proposed Boven Solar PV4 is 284 ha, but it will only cover an approximate area of 220 ha; hence major environmental constraints can be avoided. Page 3-5 confirmed that the affected vegetation type is Bushmanland Arid Grassland (kindly note there are two different pages with this number). The report stated that a few species of conservation importance may be present on the sites, but this will only be confirmed during the site visit. Kindly ensure that the anticipated impacts on NFA listed protected tree species are assessed during the EIA phase and give an accurate estimation of the number of protected trees per species and size classes to be destroyed as a result of the proposed development</p>	<p>regulations, Department of Agriculture, Forestry and Fishery</p>		<p>undertaken and is included in Chapter 8 of this EIA Report. The anticipated impacts on NFA listed protected tree species were assessed in this study. An estimation of the number of protected trees and size classes that may be destroyed as a result of the proposed development is provided in the said study. As noted under no. 4.4, the project applicant avoids the sensitivity features (including protected trees) in the project layout as can be seen in the sensitivity maps included in Chapter 17 (Figures 17.2-17.4) and in the EMPr (Part B of this EIA Report).</p>
4.11	<p>Please note that this Department will assess the cumulative impacts on protected trees for the seven (7) x 75MW Solar PV facilities, since all facilities are located within the same geographical area. The total area to be cleared of vegetation is said to be ±2 285 ha (of the total farms area of 14 380 ha). Clearing of 2 285 ha may have significant impacts on slow growing protected tree species regarded as keystone species upon which many other plants and animals depend for survival in semi-arid regions. If unavoidable impacts are significant, an environmental offset may be required.</p>	<p>Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery</p>	<p>Letter dated 01/12/2015</p>	<p>Comment noted. The cumulative impacts on protected trees have been assessed in the Vegetation and Wetlands Specialist study (Chapter 8 of this EIA Report). It should be noted that the solar PV projects will occupy an area of approximately 220 ha each, i.e. 1 540 ha for the seven projects. This makes up approximately 11% of the overall total area of the farms. Approximately 50% of the 220 ha will be covered by solar PV panels, but less than 10% of the ground is actually taken up by foundations/piles, etc. Therefore all the vegetation on site will not be cleared, less than 10% of the vegetation within the project area will be cleared. The site layout aims to avoid the sensitive protected trees as much as practically possible (Figures 17.2-17.4). Where the trees cannot be avoided the relevant permits will be obtained from the conservation authorities for the removal and transplanting of the trees.</p>
4.12	<p>Page 6-6 stated: 'Should any of the Quiver Tree (<i>Aloe dichotoma</i>) individuals... be damaged, cut or removed off-site, a permit would first need to be obtained from</p>	<p>Jacoline Mans, Chief Forester: NFA regulations,</p>	<p>Letter dated 01/12/2015</p>	<p>Comments noted. Should Quiver Tree individuals be removed from site, the relevant permits will be obtained from the DAFF, Upington Office. The Flora Permit for removal of Quiver</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	the DAFF, Upington office.” Kindly note Quiver Trees are protected under the provincial Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA) and the Flora Permit for removal of Quiver Trees must be obtained from the provincial Department of Environment and Nature Conservation (DENC). To the best of my knowledge there is currently a moratorium in place in the Northern Cape prohibiting the removal of <i>A. dichotoma</i> from the wild (Proclamation No. 986 of 1 April 2005). Enquiries in this regard should be addressed to the DENC.	Department of Agriculture, Forestry and Fishery		Trees will be obtained from the DENC. The DENC will be consulted with during and after the EIA process should a Flora Permit be required for the removal of Quiver Trees. Should it not be possible to avoid the Quiver tree individuals on site, transplanting of the individuals should be considered rather than removing it from the wild. Individuals of <i>Aloe dichotoma</i> (and <i>Hoodia gordonii</i>) that will be affected by the proposed activities will be searched for prior to construction and will be relocated to a suitable habitat. This job has to be supervised by a suitably qualified horticulturist who understands dryland species. These species may have to be temporarily planted in a nursery.
4.13	Page 6-6 indicated that the full ecological impact assessment will be undertaken during the EIA phase. Kindly supply a copy of the ecological impact assessment report to DAFF (Forestry Office in Upington) for comments once available. All possible efforts should be made to avoid sensitive areas and to minimize impacts on slow growing protected trees by placing infrastructure in the areas where it would have the least impact on such trees.	Jacoline Mans, Chief Forester: NFA regulations, Department of Agriculture, Forestry and Fishery	Letter dated 01/12/2015	CSIR: Comments noted. Copies (Hard copies or CDs) of the EIA Reports (which include the Vegetation and wetlands study; Chapter 8) will be supplied to the DAFF (Forestry Office in Upington) for comment. As noted in 4.4 and 4.6 above the vegetation specialist has identified sensitive areas that need to be avoided (including sensitive and protected trees). The project layout avoids these sensitive areas as far as possible (refer to the sensitivity and layout maps included in Chapter 17 (Figures 17.2-17.4) and the EMPr).

5. Socio-economic issues

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
5.1	I would just like to enquire whether the applicant will make use of local, registered service providers (Businesses) during the project to enhance and build local service providers and infrastructure.	Myren C Bock, Executive Director, MJ Universal Enterprise (Pty) Ltd.	27/10/2015 Email	Comments noted. The proposed projects will create local job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the DEA). The project applicant will appoint local, registered service providers where possible. Employment opportunities will be advertised in the local press

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				and through appropriate sources in the area to provide an opportunity for the local community (including the youth) to apply for jobs.

6. Impacts on watercourses

* Please note that these comments were received after the commenting period on the Scoping Report closed and after the Scoping Report was finalised for submission to DEA.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
6.1	<p>The Department of Water and Sanitation (DWS) hereby acknowledges receipt of your scoping and environmental impact assessment for the proposed development of a 75 MW solar photovoltaic facility (Boven Solar PV4) on the remaining extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province. The department has reviewed the document and the comments are as follows:</p> <p>Please note that no development should take place within 100 m horizontal distance from a water course or within 1:100 year flood line. Operation and storage of equipment within the riparian zone must be limited as far as possible.</p>	Ms Chantèl Schwartz, Lower Orange Water Management Area Department of Water and Sanitation	7/12/2015 Letter	<p>Comments noted.</p> <p>It is important to re-iterate that as far as possible, the proposed structures and infrastructure will be sited outside of the sensitive areas as identified by the specialists (Chapters 7 to 14 of this EIA Report). In particular, Vegetation and Wetlands study as well as the Avifaunal study included a survey of the area available for development. The specialists highlighted sensitive environmental features (such as watercourses, and protected vegetation species etc.) that occur within the surveyed area. Refer to the Vegetation and Wetlands Impact Assessment (included in Chapter 8 of this EIA Report) and the Avifaunal Assessment (Chapter 9) which provide details on the sensitivity of the areas and buffer zones to avoid these areas, including watercourses.</p> <p>The 100 m set back from watercourses proposed by DWS is noted, however given the fact that hydrogeomorphological indicators and vegetation structure have been used to delineate drainage features; a 100 m non-development area around such features is considered excessive.</p> <p>The 100 m exclusion area around the drainage lines would</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>incorporate extensive tracts of land which are in no way indicative of the concentrated surface hydrology. The use of the more conservative 32 m buffer is appropriate as this incorporates the identified vegetation indicators and provides a cordon around the erosive edges of such hydrological features. The width of the fringing vegetation along the watercourses is generally very narrow and often does not exceed a 10 m wide strip along each bank.</p> <p>The Ecological Impact Assessments (Vegetation and Wetlands and Avifauna) propose the following buffer zones and were included in the development footprint planning (see Figures 17.1 and 17.3):</p> <ul style="list-style-type: none"> • 100 m from NFEPA rivers and wetlands (National priority); • 32 m from all other major watercourses (e.g. <i>Prosopis glandulosa</i>) where waterbirds could congregate when surface water is present; • 20 m from minor drainage lines; and • 100 m from watering points and dams. <p>The Ecological specialist studies and EMPr also include recommendations to mitigating any potential negative impacts on nearby watercourses and surface hydrological features during the construction and operational phases. These include the recommendation that workers will not be allowed outside the demarcated construction areas or camps or beyond the boundaries of the solar PV facility itself, i.e. they will not be allowed to wander across the undeveloped parts of each site.</p>
6.2	Damaging the beds and banks of a water course has been identified as one of the potential impacts by the development. Please note that altering the bed, banks			Noted. The applicant will apply to DWS for the Water Use Licences (WULs) as required. The Vegetation and Wetlands specialist study (Chapter 8 of this EIA Report) contains details

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>and characteristic flow of a watercourse is identified as a water use by the National Water Act and carrying out such activity will need a Water Use Licence Application in terms of the above-mentioned act.</p>			<p>regarding the requirements of WULAs pertaining to the solar PV projects.</p> <p>However, it is important to note that considerable efforts were made to place the proposed solar field and project infrastructure outside of wetland areas and any sensitive surface hydrological features identified by the specialist (see Figures 17.2-17.4). As noted above, a 32 m buffer has been recommended around the major drainage line. No construction will occur within 32 m of the major drainage lines as recommended in the Wetlands Impact Assessment.</p> <p>The DWS will be consulted with during the EIA Process to confirm the need for a WUL, as well as to seek further comment on the proposed project.</p>
6.3	<p>Any spillage of any hazardous materials including diesel that may occur during construction and operation must be dealt with and reported to this Department within 24 hours.</p>			<p>It is important to note that it is proposed to store less than 30 m³ of dangerous goods (such as petrol and diesel) on site during the construction phase. Recommendations for the temporary storage of petrol and diesel on site during the construction phase are provided in the EMPr (Part B of the EIA Report). The proposed solar facility will also undergo routine maintenance which will necessitate the use of hydraulic oils, grease and other lubricants. Recommendations for the management of potential spillages of oil, chemicals or fuel during the construction and operational phases are included in the EMPr. The EMPr stipulates that all spillages that occur on site as a result of the proposed project must be cleaned immediately, with correct disposal of the resulting spilled material. The regional DWS will be informed within 24 hours of any significant spills that occur on site during the construction and operational phases.</p> <p>The EMPr further states: "Ensure that adequate containment</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>structures are provided for the temporary storage of liquid dangerous goods and hazardous materials on site (such as chemicals, oil, fuel, hydraulic fluids, lubricating oils etc.). Appropriate bunded areas must be provided for the storage of these materials at the site camp. Bunded areas should contain an impervious surface in order to prevent spillages from entering the ground. Absorbent materials should be available on site to mop up spills. The used materials must be disposed of at an appropriate waste disposal site. Bunded areas should have a capacity of 110 % of the volume of the largest tank in the bund (tanks include storage of fuel/diesel)".</p>
6.4	<p>Material with pollution generating potential must be limited in any construction activities. Any hazardous substances must be handled according to the relevant legislation relating to transport, storage and use of the substance.</p>			<p>Noted. The relevant requirements of the National Environmental Management: Waste Act (Act 59 of 2008) regarding the handling, storage, transport and use of hazardous waste will be adhered to.</p>
6.5	<p>Storm water must be diverted from the construction works and roads and must be managed in such a manner as to disperse runoff and to prevent the concentration of stormwater flow. Where necessary, works must be constructed to attenuate the velocity of the storm water discharge and to protect the banks of the watercourse.</p>			<p>Noted. These recommendations for stormwater management will be considered by the Applicant during the design phase, as applicable and where possible. Recommendations for erosion control and stormwater management are included in the relevant specialist studies undertaken during the EIA Phase, as well as the EMPr (Part B of the EIA Report).</p>
6.6	<p>All sewage, grey and wash water, as well as any waste generated during the construction phase of the facilities will be collected, contained and disposed of at the permitted and/or licenced facilities of the Local Authority and this must please be confirmed in writing by the local authority.</p>			<p>As noted in Chapter 4 of this EIA Report, waste will be generated during the construction, operational and decommissioning phases of the proposed project. Recommendations for the management of waste in order to reduce potential negative impacts on the surrounding environment have been included in the EMPr (Part B of the EIA Report), as applicable. During the construction and operational phase, all waste will be safely stored, and will be removed from site on a scheduled basis by an appointed contractor. The</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>waste, where applicable, will be disposed at a licenced municipal landfill site. Confirmation from the municipality (in terms of landfill space and provision of services) will be sought during the EIA Phase. During the operational phase, the regional DWS will be informed of any agreements reached with the Local Authority in terms of waste management and disposal. Nevertheless, all waste generated during the construction, operational and decommissioning phases of the proposed project will be correctly disposed at a registered waste disposal facility and proof of disposal will be obtained and retained on file, for auditing purposes. The requirements of the National Environmental Management: Act (Act 59 of 2008) regarding the disposal of waste will be adhered to.</p>

7. Comments from the National Department of Environmental Affairs on the Scoping Report

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
7.1	<p>DEA Reference: 14/12/16/3/3/2/847</p> <p>The Department confirms having received the application for environmental authorisation and the Draft Scoping report for the abovementioned project on 28 October 2015. You have submitted these documents to comply with the Environmental Impact Assessment Regulations, 2014.</p> <p>Further note that in terms of regulation 45 of the EIA Regulations, 2014 this application will lapse if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless an extension has been granted in terms of regulation 3(7).</p> <p>You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental being granted by the Department.</p>	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 30/10/15	Comment noted.
7.2	<p>The draft Scoping Report (SR) dated October 2015 and received by this Department on 28 October 2015 refers.</p> <p><u>This Department has the following comments on the abovementioned application:</u></p>	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	Noted.
7.3	<p>Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description.</p>	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	The relevant listed activities that are understood to be applicable and relevant to the proposed project have been included in the Application for EA that was submitted to the DEA with the Scoping Report. The Application for EA for the project is included in Appendix B of this Scoping Report, with proof of submission (i.e. courier waybills) and DEA's acknowledgement of receipt included in Appendix E and Appendix G of this EIA Report respectively.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				It should be noted that following the specialist studies undertaken in the EIA phase the Application form will be amended and will be submitted to DEA with the finalised EIA Report for decision-making. The relevant changes to the Applicant for EA are included in Section 9 (i) below in the comments section of the approval of Scoping from DEA.
7.4	If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms .	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	Comment noted. Refer to the response above. An amended Application for EA will be submitted to the DEA together with the submission of the finalised EIA Report for decision-making, using the DEA's templates as recommended.
7.5	Please ensure that all issues raised and comments received during the circulation of the SR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the Final SR. Proof of correspondence with the various stakeholders must be included in the Final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	<p>Comment noted. The issues raised and comments received from I&APs and organs of state during the Project Initiation Phase and Scoping Phase (i.e. based on a 30-day review of the BID and Scoping Report) were captured in the Issues and Responses Trail and addressed in this finalised EIA Report, where required and as applicable (Chapter 6 of the EIA Report, i.e. this chapter). The comments raised during the Scoping Phase by stakeholders, I&APs and Organs of State have been retained in the EIA Report and updated responses have been provided where applicable.</p> <p>Proof of correspondence sent to registered I&APs and stakeholders during the Project Initiation and Scoping Phases is included in Appendix E of this EIA Report. All correspondence sent by I&APs during the Project Initiation Phase (i.e. prior to the release of the Scoping Report) and during the 30-day review of the Scoping Report and after the review period are included in Appendix G of this EIA Report. It is important to note that all comments received from I&APs during the review of EIA Report will be included in the</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>Comments and Responses Trail, as well as the appendices of the finalised EIA Report, which will be submitted to the DEA for decision-making.</p> <p>The PPP for this Scoping and EIA Process is being undertaken in compliance with the 2014 EIA Regulations, as summarised below:</p> <ul style="list-style-type: none"> - Regulation 39: Proof of notice to the landowner and permission from the landowner has been obtained and is included in Appendix 4 of the Application for EA (Appendix B of the Scoping Report). - Regulation 40: Throughout the Scoping Phase, all reports and documents compiled for public review (such as the BID and Scoping Reports) were made available to registered and pre-identified I&APs, including the DEA, for a 30-day comment period. In addition, the EIA Report will now be made available for public review for a period of 30-days. The PPP undertaken thus far has provided all project information available, which is understood to be important for the decision-making phase. - Regulation 41: As noted in Chapter 4 of this EIA Report, site notice boards were placed for the commencement of the Scoping and EIA Processes. A copy of the notice boards and proof of placement thereof is included in Appendix F of this EIA Report. In addition, during the Project Initiation Phase, written notification letters were sent to pre-identified I&APs to inform them of the proposed projects and invite potential I&APs to register on the project database. Furthermore, in order to notify

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>the public of the proposed project and invite I&APs to register on the project database, the project and EIA Process was advertised in one local newspaper (i.e. The Gemsbok), as shown in Appendix D of this report. During the Scoping Phase, letters were sent to registered and pre-identified I&APs to notify them of the release of the Scoping Reports for comment. These letters were mailed via registered mail and email (where postal, physical and email addresses were available). Copies of the written notifications sent during the Project Initiation and Scoping Phases are included in Appendix E of this EIA Report. During the EIA Phase (i.e. this phase), letters were sent to registered and pre-identified I&APs, and an advertisement was placed in a local newspaper (i.e. The Gemsbok) as a notification of the release of the EIA Reports for comment. It is not anticipated that the proposed project will have an impact beyond the boundary of the Local Municipality; therefore a local newspaper was used during the PPP. Regulation 41 (2) (e) of the 2014 EIA Regulations is not applicable at this stage, however it will be complied with as agreed by the Competent Authority should the need arise as part of the PPP.</p> <ul style="list-style-type: none"> - Regulation 42: As noted in Chapter 4 of this EIA Report, an initial database of I&APs (including key stakeholders and organs of state) was developed. Appendix C of this EIA Report contains the current I&AP database, which has been updated to include requests to register interest in the project, and comments received during the 30-day review of the Scoping Report. I&AP details are being captured and automatically updated as and when information is distributed to or received from I&APs.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>- Regulation 43: As noted above, registered I&APs and relevant organs of state have been provided with a 30-day comment period on the BID and Scoping Reports. Registered I&APs and relevant organs of state are also being provided with a 30-day comment period on the EIA Reports.</p> <p>Regulation 44: The comments raised by I&APs thus far during the Scoping Phase have been recorded in this EIA Report, with responses provided by the EAP and Project Applicant, which have been updated where required.</p>
7.6	<p>In accordance with Appendix 2 of the EIA Regulations 2014, the details of – <i>(i) the EAP who prepared the report; and</i> <i>(ii) the expertise of the EAP to carry out Scoping and Environmental Impact assessment procedures; must be submitted.</i></p>	<p>Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments</p>	<p>Letter dated 10/11/2015</p>	<p>Comment noted. The details of the EAP who prepared the Scoping Report and the expertise of the EAP were included in Chapter 1 and Appendix A of the EIA Report. Appendix B includes the EAP's declaration of interest.</p> <p>Appendix A of this EIA Report includes the Curriculum Vitae of the EAP, as well as the specialist team. Appendix B of this EIA Report includes the declaration of independence and interest of the EAP and the specialist team.</p>
7.6	<p>This Department requires comments from SKA-SA to be included in the final SR.</p>	<p>Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments</p>	<p>Letter dated 10/11/2015</p>	<p>Comments from the SKA Project Office were received during the Scoping Phase (Section 3 of this table). Copies of the comments raised by the SKA are included in Appendix G of this EIA Report.</p> <p>As noted in Chapter 4 of this EIA Report Mulilo appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of Proposed PV Projects in AGA Area, to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project. The study is included in Appendix J of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office will review the findings of this study and provide feedback during the EIA Phase.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
7.8	This Department requires a cumulative impact assessment to be undertaken in the final SR.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	The cumulative impacts were assessed in the specialist studies undertaken during the EIA Phase (Chapters 7 to 15) of the EIA Report. The Conclusions chapter (Chapter 17) also provides a summary of all the cumulative impact assessments.
7.9	This Department requires that the Socio-Economic Impact Assessment undertaken by the CSIR must be peer reviewed by an external specialist.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	The Socio-Economic study prepared by the CSIR specialist during the EIA phase was independently reviewed by an external reviewer (Ms. Liza van der Merwe, a private consultant), as requested by the DEA. A copy of the review is included in Appendix 14.A of the Socio-Economic Study (Chapter 14 of the EIA Report). The review report indicated that the report is adequate in general.
7.10	You are further reminded that the final SR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of scoping reports in accordance with Appendix 2 and Regulation 21(1) of the EIA Regulations, 2014.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	The requirements of Appendix 2 of the 2014 EIA Regulations were fulfilled in the Scoping Report, as shown in Chapter 1 (Table 1.3) and Chapter 8 (Table 8.1) of the Scoping Report (CSIR, 2015). The DEA accepted the Scoping Report on 28 January 2016 (as shown in Appendix G of this EIA Report).
7.11	Further note that in terms of Regulation 45 of the EIA Regulations 2014, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of these Regulations, unless an extension has been granted in terms of Regulation 3(7).	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	Comment noted.
7.12	You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	Letter dated 10/11/2015	Comment noted.

8. Comments from the Department of Environment & Nature Conservation (DENC) following the release of the Scoping Report for comment

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
8,1	The DENC reviewed the Scoping Report and came to the following concerns on the report that was reviewed. The nature and the quantity of raw materials needed during construction phase. Their source, transportation to site, storage on site and pollution potential must be described.	Mr Ordain Riba, Environmental Officer: Impact Management, Department of Environment and Nature Conservation	Letter dated 2/12/2015	Comment noted: Construction and environmental best practices will be undertaken by the contractor to minimize pollution during the construction phase. The EMPr describes these practices and will form the guideline rules for the contractor to adhere to. The project will follow a light on land approach and only source materials from authorized sources.
8.2	How many of these raw materials would be sourced locally (Northern Cape)?			The project will aim to achieve a local content of above 60%, whereby 60% of the project capex will be spent in South Africa. Of this 60% a large portion will be spent in the Northern Cape, however much of the key components and services which make up the bulk of the project are not manufactured / offered in the Northern Cape.
8.3	How many litres would be used to wash panels and has that number be factored in that the proposed project is located in a dusty area.			The project has performed a detailed water consumption calculation for both the construction and operational phases. The project will require the following: <ul style="list-style-type: none"> • 4 000 Kiloliters of water per year during construction. • 700 Kiloliters of water per year for the 20 years operational phase.
8.4	The amount of energy needed during the construction phase, a description of the source and the availability.			On-site auxillary power will be provided by Eskom through the Nieuwehoop Substation during construction, this equates to a peak demand of roughly 200 kW or 1 200 kWhs per day.
8.5	Compliance with the Environmental Management Framework of Siyanda District (ZFM EMF) must be indicated in the report.			Comment noted. The EIA Report shows compliance with the Environmental Management Framework of the Siyanda District in Table 1.2 in Chapter 1 of this EIA Report.
8.6	Please explore alternatives of shared laydown areas or central laydown areas to avoid patches of compacted areas.			Comment noted. Alternatives for shared or central laydown areas were investigated by the project applicant to avoid fragmentation of compacted areas.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
8.7	During the construction phase of the project will diesel be stored on site and if the diesel will be stored on site, in what quantities will the diesel be stored?			Less than 5000 L of Diesel will be stored on site.
8.8	Must ensure that soil compaction is only done when necessary and the rest of the undisturbed land is not used as thoroughfares so as to avoid reduction of soil infiltration capacity and increase in soil erosion.			Comment noted. Soil compaction will only be done when necessary. The comments have been included in the EMPr to ensure that undisturbed areas will not be used as thoroughfares that can lead to soil erosion.
8.9	Must indicate in numbers as to how many protected trees will be affected by the proposed project, the accuracy of the numbers is very vital as it gives the department an idea of what the cumulative impacts are when comparing this numbers with the other projects around the same place.			A Vegetation and Wetland Specialist study was undertaken in the EIA phase (Chapter 8 of the EIA Report). The study includes an assessment of potential impacts on protected trees. The number of protected trees that may be affected is included in the study. The Vegetation study provided recommendations to avoid sensitive ecological areas or features, including protected trees. The recommendations have been incorporated into the project layout by the project applicant (see Figures 17.2 to 17.4 of the EIA Report).
8.10	The applicant must ensure that concrete batching and mixing is not done around water bodies (drainage lines or washes) to avoid contamination.			Comment noted. The project contractor and/or Environmental Control Officer (ECO) will ensure that no mixing is done around water bodies. This recommendation is included in the EMPr.
8.11	Must ensure that the exposed topsoil stockpiled is protected and covered to avoid being blown by wind and eroded by rain.			Comment noted. The project contractor will ensure that exposed stockpiles are covered. This recommendation is included in the EMPr.
8.12	Waste generated on-site must be identified, classified and disposed accordantly at a licensed landfill.			Comment noted. The project contractor will ensure that waste generated on site will be classified and disposed of at an appropriate licenced landfill site to meet the requirements of the National Waste Management Act of 2008. These recommendations are included in the EMPr.
8.13	How would the locally employed workers be made aware of the social health risk related to temporary employment projects e.g. HIV/AIDS and alcoholism.			Training of employees during the construction phase of the project will include a number of workshops on the effects of drug abuse, alcoholism and HIV/Aids. This has been done on all the previous projects of Mulilo and forms part of their economic development commitments.
8.14	How many local and non-local people would be			It is estimated that between 60 and 90 skilled and 100 and 120

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	employed during the construction and operation phase of the proposed project?			unskilled employment opportunities will be created during the construction phase. During the operational phase, approximately five skilled and seven unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase. Less than 20% of the work force will be foreign.
8.15	Please do not hesitate to contact the Department if you have any queries regarding the contents of this letter.			Comment noted.

Scoping Phase: DEA Acceptance of Scoping Report

9. Comments received from the National DEA on Boven Solar PV4 project (as part of the joint PPP for the Phase 2 Nieuwehoop Solar Park Development) as part of the Scoping Acceptance (see Appendix G) documented as a Issues and Response Trail.

	ISSUES RAISED	RESPONSE
	All comments and recommendations made by all stakeholders and Interested and Affected Parties (I&APs) in the draft SR and submitted as part of the final SR must be taken into consideration when preparing an Environmental Impact Assessment report (EIAR) in respect of the proposed development.	Comments have been considered and addressed by the EAP and appointed specialists.
	Please ensure that all mitigation measures and recommendations in the specialist studies are addressed and included in the final EIAR and Environmental Management Programme (EMPr).	All mitigation measures proposed by specialists are included in the EIAR and EMPr.
	Please ensure that comments from all relevant stakeholders are submitted to the Department with the final EIAR. This includes but is not limited to the Northern Cape Department of Environmental and Nature Conservation, the Department of Agriculture, Forestry and Fisheries (DAFF), the provincial Department of Agriculture, the South African Civil Aviation Authority (SACAA), the Department of Transport, the Local Municipality, the District Municipality, the Department of Water and Sanitation (DWS), the South African National Roads Agency Limited (SANRAL), the South African Heritage Resources Agency (SAHRA), the Endangered Wildlife Trust (EWT), BirdLife	All these stakeholders were included on the database (see Appendix C – I&AP Database). Where interest was indicated and/or comments were received from said stakeholders, these were included in this Comments and

	ISSUES RAISED	RESPONSE
	SA, the Department of Mineral Resources, the Department of Rural Development and Land Reform, the Department of Environmental Affairs: Directorate Biodiversity and Conservation and the Square Kilometre Array (SKA).	Responses Report (Chapter 6, i.e. this chapter) and considered by the EAP and specialists in preparation of the EIAR and EMPr.
	You are also required to address all issues raised by Organs of State and I&APs prior to the submission of the EIAR to the Department.	Noted.
	Proof of correspondence with the various stakeholders must be included in the EIAR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Noted, proof of correspondence to date is included in Appendix E and G of the EIA Report. Proof of correspondence following the release of the EIAR for a 30-day commenting period will be included in the finalised version of the EIAR that will be submitted to DEA for decision-making.
	The EAP must, in order to give effect to Regulation 8, give registered I&APs access to, and an opportunity to comment on the report in writing within 30 days before submitting the final EIAR to the Department.	This EIAR is available for a 30-day commenting period, before planned final submission to the DEA in May 2016.
i.	<p>Following a review of the application form and SR received in October 2015 and December 2015 respectively, this Department advises that the application form must be amended and resubmitted to include the correct listed activities. As such the Department advises that the following listed activities and their relevant issues be addressed:</p> <p><u>GN R. 983 Item 12:</u></p> <p><i>“The development of –</i> <i>(x) buildings exceeding 100 square metres in size;</i> <i>(xii) infrastructure or structures with a physical footprint of 100 square metres or more;</i></p>	<p>Comment noted. The application form will be revised and will be submitted to DEA with the finalised EIA Report for decision-making.</p> <p>Part (c) is applicable to the project as some of the powerline poles or foundations may be constructed within 32 m from a watercourse.</p> <p>The application form will be amended by omitting Parts (a) and (b) of this</p>

	ISSUES RAISED	RESPONSE
	<p><i>Where such development occurs-</i></p> <p>(a) <i>within a watercourse</i></p> <p>(b) <i>in front of a development setback; or</i></p> <p>(c) <i>if no development setback exists, within 32m of a watercourse, measured from the edge of a watercourses."</i></p> <p>The Environmental Assessment Practitioner must apply for the specific aspect of the activity, i.e. either part (a) or part (b) etc. as all of these parts of the activity cannot be authorised.</p>	<p>relevant activity, i.e. GN R. 983 Item 12.</p>
	<p><u>GN R. 983 Item 19:</u></p> <p>"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-</p> <p>(i) a watercourse;</p> <p>(ii) the seashore; or</p> <p>(iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water of the sea or an estuary whichever distance is the greater."</p> <p>The Environmental Assessment Practitioner must apply for the specific aspect of the activity, i.e. either part (i) or part (ii) etc. as all of these parts of the activity cannot be authorised.</p>	<p>Part (i) indicating a watercourse is applicable to the project. Parts (ii) and (iii) are not applicable as the project will not be developed in the coastal zone or off-shore.</p> <p>The application form will be amended by omitting Parts (ii) and (iii) of this relevant activity, i.e. GN R. 983 Item 19.</p>
	<p><u>GN R. 983 Item 24:</u></p> <p>"The development of-</p> <p>(ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres."</p> <p>The Environmental Assessment Practitioner must apply for the specific aspect of the activity, i.e. either a road with a reserve wider than 13, 5 meters, or where no reserve exists as all of these parts of the activity cannot be authorised.</p>	<p>Please note this activity no longer applies.</p> <p>Should the Transnet Service Road not be used for access to the preferred site, then the unnamed farm gravel road will be used and widened to approximately 6 m. Internal roads within the PV plant will be constructed within the project footprint which will be 6 m. This is</p>

	ISSUES RAISED	RESPONSE
		below the 8 m threshold and this activity therefore does not apply. Please note the application form will be updated accordingly and will be submitted to DEA with the finalised version of the EIA Report.
ii.	<p>The EIAr must include the following:</p> <p>GN R.983 Item 19: With regards to infilling and excavation of watercourses for the construction of the PV Solar Energy facility, this Department requires the applicant to provide an indication of the preferred and alternate locations from which the material used for infilling will be sourced and where excavated material will be stored and/or disposed of. In addition, the impacts associated with this activity must be adequately assessed in the EIAr.</p>	The areas marked as the roads, substation and laydown areas will be cut and filled as required. Material will only be extracted or filled from these areas. The remainder of the site will be left to follow the natural topography. Material will not be sourced from other areas and will not be stored on site.
iii.	The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	Assessment of impacts and associated mitigation measures are included in Chapter 7-14 of this EIAr.
iv.	The listed activities represented in the EIAr and the application form must be the same and correct.	Noted.
v.	It is imperative that the relevant authorities are continuously involved throughout the EIAr process as the development property possibly falls within geographically designated areas in terms of all activities under GN R.985. Written comments must be obtained and submitted to this Department. <u>In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.</u>	The application form which was initially submitted to DEA includes listed activity 12 (d) under GN R.985. It was initially thought that the development possibly falls within a geographically designated area in terms of GN R.985. However, the proposed project does not trigger any listed activities within GN R985. This was confirmed in the Ecological Impact Assessment (Chapter 8 of this EIA Report). Overall, the proposed

	ISSUES RAISED	RESPONSE
		project site is not located within any protected areas, or within 5 km of a protected area, or within 10 km of a World Heritage site. Furthermore, the proposed project site does not fall within a Critical Biodiversity Area or within any expansion area in terms of a conservation strategy for the Northern Cape.
vi.	Based on the high risk of detrimental impact that the proposed facility poses on the SKA, further Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) detailed studies must be conducted as significant mitigation measures would be required to lower the risk of detrimental impact to an acceptable level. The South African SKA Project Office must be kept regularly informed of progress and be consulted on the details of the studies required.	Mulilo appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of Proposed PV Projects in AGA Area, to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project. The study is included in Appendix J of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office will review the findings of this study and provide feedback during the EIA Phase.
vii.	The EMI and RFI study must also assess cumulative impacts from the other Renewable Energy Facilities in the Area.	The study assessed cumulative impacts from other renewable energy facilities in the area.
viii.	Comments on the EMI and RFI study must be obtained from South African SKA Project Office.	A copy of the EIA Report containing the EMI and RFI study will be send to the SKA Project Office during the 30-day review period of the EIA Report. These comments will be incorporated into the finalised EIA Report which will be submitted to DEA for decision-making.
ix.	The EIAR must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under point 2 of the EIA information	Technical details of the proposed facility and associated electricity

	ISSUES RAISED	RESPONSE
	required for solar energy facilities below.	infrastructure is summarised in this EIAr in Table 2.3 in Chapter 2: Project Description.
x.	The EIAr must provide the four corner coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	The coordinates are included in Table 2.2 in Chapter 2.
xi.	The EIAr must provide the following: Clear indication of the envisioned area for the proposed solar energy facility; i.e. placing of photovoltaic panels and all associated infrastructure should be mapped at an appropriate scale. Clear description of all associated infrastructure. This description must include, but is not limited to the following: <ul style="list-style-type: none"> ➤ Power lines; ➤ Internal roads infrastructure; and; ➤ All supporting onsite infrastructure such as laydown area, guard house and control room etc. ➤ All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation. 	The proposed layout plan is included in the Conclusions chapter of this EIAr (Chapter 17; see Figures 17.2-17.4) where the optimised footprints are presented. A description of the associated infrastructure is provided in Chapter 2.
xii.	The EIAr must also include a comments and response report in accordance with Appendix 2 h (iii) of the EIA Regulations, 2014.	The Comments and Response Report is included in Chapter 6 (this chapter) in accordance with Appendix 2 h (iii) of the EIA Regulations, 2014.
xiii.	The EIAr must include the detail inclusive of the PPP in accordance with Regulation 41 of the EIA Regulations.	Details of the integrated PPP followed for the Phase 2 Nieuwehoop Solar Park is presented in Chapter 4 of this EIAr. The PPP was executed in accordance with Regulation 41 of the EIA Regulations.
xiv.	Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies.	Future plans for the site and infrastructure are included in Chapter 2.
xv.	Information on services required on the site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? Proof of these agreements must be provided.	Details of services required and where such services will be sourced are presented in Chapter 2. Services will be sourced from the local municipality. The project Applicant will consult with the municipality in order to confirm the supply of services

	ISSUES RAISED	RESPONSE
		(in terms of water, waste removal, sewage and electricity) for the proposed project.
xvi.	The EIAR must provide a detailed description of the need and desirability, not only providing motivation on the need for clean energy in South Africa of the proposed activity. The need and desirability must also indicate if the proposed development is needed in the region and if the current proposed location is desirable for the proposed activity compared to other sites.	The need and the desirability of the proposed Phase 2 Nieuwehoop Solar Park development is presented in Table 1.2 in Chapter 1 of this EIA Report.
xvii.	<p>A copy of the final site layout map and alternatives. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following:</p> <ul style="list-style-type: none"> • PV positions and its associated infrastructure; • Permanent laydown area footprint; • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; • Substation(s) and/or transformer(s) sites including their entire footprint; • Connection routes (including pylon positions) to the distribution/transmission network; • All existing infrastructure on the site, especially roads; • Buffer areas; • Buildings, including accommodation; and • All "no-go" areas. 	A site layout map containing the requested information is included in Figure 17.4 of Chapter 17 (Conclusion chapter) and in the Environmental Management Programme (EMPr) of this EIA Report.
xviii.	An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	An environmental sensitivity map containing the requested information is included in Figure 17.3 of Chapter 17 (Conclusion chapter) and in the Environmental Management Programme (EMPr) of this EIA Report.

	ISSUES RAISED	RESPONSE
xix.	A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	An environmental sensitivity map with the final layout overlain is presented in Figure 17.4 in Chapter 17 (Conclusion chapter) and in the Environmental Management Programme (EMPr) of this EIA Report.
xx.	A shapefile of the preferred development layout/footprint must be submitted to this Department. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp, shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title.	The requested data, in the requested format and according to the requested specifications will be submitted, together with the EIAR, to the address supplied in the letter (Scoping Acceptance letter- Appendix G).
	The Environmental Management Programme (EMPr) to be submitted as part of the EIAR must include the following:	An EMPr is attached as Part B of this EIA Report.
i.	All recommendations and mitigation measures recorded in the EIAR and the specialist studies conducted.	The EMPr includes recommendations and mitigation measures recorded in the EIA Report and the specialist studies conducted.
ii.	The final site layout map.	The EMPr includes the final site layout map.
iii.	Measures as dictated by the final site layout map and micro-siting.	The EMPr includes measures as dictated by the final site layout map.
iv.	An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	The EMPr includes an environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
v.	A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	The EMPr includes a map combining the final layout map superimposed (overlain) on the environmental sensitivity map.
vi.	An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	The EMPr includes an alien invasive management plan (Section 4 of the EMPr).

	ISSUES RAISED	RESPONSE
vii.	A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase	The EMPr includes a plant rescue and protection plan (see Section 5 of the EMPr).
viii.	A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.	The EMPr includes a re-vegetation and habitat rehabilitation (see Section 5 of the EMPr).
ix.	An open space management plan to be implemented during the construction and operation of the facility.	The EMPr includes an open space management plan (see Section 6 of the EMPr).
x.	A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.	The EMPr includes a Traffic, Transportation and Road Maintenance Management Plan (see Section 7 of the EMPr).
xi.	A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment	
xii.	A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction 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 must promote the dissipation of storm water run-off.	The EMPr includes a storm water management plan (see Section 8 of the EMPr).
xiii.	A fire management plan to be implemented during the construction and operation of the facility.	The EMPr includes a fire management plan (see Section 11 of the EMPr).
xiv.	An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.	The EMPr includes an erosion management plan (see Section 9 of the EMPr).
xv.	An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	The EMPr includes effective monitoring system to detect any leakage or spillage of all hazardous substances (see Section 10 of the EMPr).
xvi.	Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.	The EMPr includes measures to protect hydrological features (see Section 12 of the EMPr).

	ISSUES RAISED	RESPONSE
	Other comments:	
	The EAP must provide detailed motivation if any of the above requirements is not required by the proposed development and not included in the EMPr.	Noted. All the above-mentioned requirements are included in the EMPr.
	The EIAR must include a cumulative impact assessment of the facility since there are other similar facilities in the region. The specialist studies e.g. biodiversity, visual, noise, avifauna etc. must also assess the facility in terms of potential cumulative impacts. The specialist studies as outlined in the PoSEIA which is incorporated as part of the SR must also assess the facility in terms of potential cumulative impacts.	The specialist studies included in Chapter 7-14 as well as the EMI and RFI study included in Appendix J contain an assessment of cumulative impacts.

6.3 Issues and Responses Trail prior to the release of the Scoping Report for comment

The tables below summarise the issues raised prior to the release of the Scoping Report for I&AP review (i.e. following the project announcement and release of BID), together with a responses from the EIA team. A synthesis of issues to be addressed in the Specialist Studies is provided in the Plan of Study for EIA (Chapter 8). The results of the Specialist Studies will be made available to I&APs for comment as part of the PPP undertaken for the EIA Report. To date, the level of agreement between the EAP and the I&APs on the plan of study for undertaking the environmental impact assessment is reflected in the issues raised by the I&APs prior to the release of the Scoping Report. The level of agreement will be further determined once the I&APs had a chance to review the Plan of Study for EIA (Chapter 8 of this Scoping Report) as part of the reviewing of the Scoping Report when it is released for comment. This is to meet the requirement of section (2) (k) in Appendix 2 of the 2014 NEMA EIA Regulations.

1. EIA Process and Public Participation

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
1.1	Graag wil ons u versoek om asseblief mnr Johan van Rensburg se naam van u naamplakkers te verwyder en dit te vervang met mnr Henning Myburgh aangesien mnr Van Rensburg reeds die vorige jaar Agri Noord Kaap se diens verlaat het. (Andersins moet u dit asseblief net rig aan "Die Hoofbestuurder" Agri Noord Kaap, Posbus 1094, Kimberley, 8300. Baie dankie en ons vertrou dat u u adreslys daarvolgens	L van Niekerk, Ontvangs: ONTVANGS: Agri Noord Kaap	15 September 2015, Email	Comment noted. Mr Johan van Rensburg was removed from the project I&AP database as he no longer works at Agri Northern Cape. Mr Henning Myburg was added to the project database instead. Refer to Appendix C of this EIA Report for a copy of the current database of I&APs. Mr Myburg will receive all future correspondence on the project.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	sal aanpas.			
1.2	Kindly forward me the BID doc on the 7x 75MW pv projects at Kendhardt as we would then like to consider if we should register as an I&AP. I understand you will be out the office as from tomorrow and we would greatly appreciate it, if you could forward the document today.	Claude Bosman, Veroniva - Renewable Energy	09 September 2015, Email	Comment noted. Claude Bosman has been added to the project I&AP database. Refer to Appendix C of this EIA Report for a copy of the current database of I&APs. A copy of the BID was provided to Claude Bosman via email on 9 September 2015.
1.3	I would like to know more as to the registration as an interested party in the projects with ref: EMS0106/MULILO/2015. Please let me know as to how the process works	Myren C. Bock	10 September 2015, Email	Comment noted. Myren Bock has been added to the project I&AP database. Refer to Appendix C of this EIA Report for a copy of the current database of I&APs. A copy of the BID was provided to Myren Bock via email.
1.4	Your company is currently conducting an Environmental Impact Assessment for the Proposed Sewe Fotovoltaïese Sonkragaanlegte Noord Oos van Kenhardt. Please could you forward me the BID for this application and register me as a Interested & Affected party? Please could you also send me an English version of the EIA Notice if possible?	Melanie Miles, Content Researcher, Leads 2 Business	16 September 2015, Email	Comment noted. Melanie Miles has been added to the project I&AP database. Refer to Appendix C of this EIA for a copy of the current database of I&APs. A copy of the BID and email notice (in English) was provided to Melanie Miles via email.
1.5	Please find attached completed Registration form for Tshwalec & Solareff Joint Venture for the proposed development of seven solar photovoltaic electrical infrastructure	Nico Engelbrecht, Member, Tshwalec & Solareff Joint Venture	07 October 2015, Email	Mr Nico Engelbrecht and Mr Neels Vosloo (name on the comment form) were added to the project I&AP database. Refer to Appendix C of this EIA Report for a copy of the current database of I&APs.
1.6	This serves as a notice of receipt and confirms that your application has been captured in our electronic AgriLand tracking and management system. It is strongly recommended that you use the on-line AgriLand application facility in future. Detail of your application as captured: <i>Application type:</i> Rezoning: Seven Solar <i>Your reference number:</i> <i>Property Description:</i> Gemsbok Bult 120 & Boven Rugzeer 169	HJ Buys, Director: Land Use and Soil Management, Department of Agriculture, Forestry and Fisheries	30 September 2015, Email	Comment noted that the Department's on-line AgriLand application facility be used in future and that their reference number be used in all enquiries.

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p><i>Dated: 9 September 2015</i> Please use the following reference number in all enquiries: AgriLand reference number: 2015_09_0252 Enquiries can be made to the above postal, fax or e-mail address</p>			

2. Project Infrastructure (including transmission lines and roads)

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
2.1	<p>Please see attached letter received from J Hanekom and supply info asap Thanks</p> <p>Letter: Your Email dated 10th September 2015 and correspondence related to MULILO RENEWABLE DEVELOPMENT (PTY) LTD refers.</p> <p>It seems that the proposed development will be situated on land adjacent to 4km to (both of) Rugseer (Loop 14) to 37km to (southwest of) Oorkruis (Loop 15).</p> <p>The office in principle has no objection to the proposal, but in order for us to assess whether/ how Transnet will be affected, more detailed plans are required indicating the following:</p> <ol style="list-style-type: none"> 1. The route and location of the proposed electrical lines. 2. Proposed entry/ exit points of the Transnet Service Road from the public access point to the site. Please advise this office when the wayleave is finalised in order to update our G.I.S. 	JJ Hanekom; Senior Property Technician; Transnet Freight Rail	Letter dated 9 September sent via Email from Marina Lourens on 14 September 2015	<p>Comment noted.</p> <ol style="list-style-type: none"> 1. Mr Hanekom will be provided with a copy of the EIA Report which contains the project layout, including the powerlines. The transmission lines will extend from the proposed Solar PV Facilities to the Eskom Nieuwehoop Substation. An overhead 132 kV transmission line will be constructed for each solar facility. Depending on the location of the on-site substation, the length of the proposed overhead transmission lines, connecting the on-site substation to the Nieuwehoop Substation, can range from 2 km to 12 km. The route of the proposed power lines is shown in Figure 2.2 of Chapter 2 of this EIA Report. 2. As noted in Chapters 1 and 2 of this EIA Report, existing roads (such as a private Transnet Service Road or an unnamed farm road) will be used to gain access to the preferred site. The Transnet Service Road can be accessed from the R27 and the farm road can be accessed from the R383 Regional Road also via the R27 National Road. An internal gravel road may also be constructed from either the Transnet Service Road or the unnamed farm road. Discussions will be held between Transnet Freight Rail and the Project Applicant to discuss the requirements for use of the Transnet Service Road. <p>Mr JJ Hanekom will be advised when the wayleave is finalised.</p>
2.2	<p>The above listed proposed project bears reference. The South African National Roads Agency SOC Limited (SANRAL) has received background information and locality plan. After a detailed review of the proposed project scope, it was established that your project will not impact on SANRAL jurisdiction in any way since its located in close proximity to R383, hence no further</p>	Nicole Abrahams, Environmental Coordinator, Sanral Western Region	17 September 2015, Email	<p>Comment noted. Based on the conceptual design, it is not anticipated that any service infrastructure will be located within 60 m of the national road, or crossing the national road. It is duly noted that when the proposed project is in close proximity of a National Road (60 m parallel to road reserve fence or if it crosses), application will be lodged with the SANRAL by the Applicant.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>comments will be forthcoming from this office. Of particular interest to Sanral is when the proposed project is in close proximity of a National Road (60 m parallel to road reserve fence or if it crosses)</p> <p>For any further queries do not hesitate to contact the sender.</p> <p>I trust that you will find the above in order.</p>			
2.3	<p>Please find attached Eskom requirements for works at or near Eskom infrastructure (full document of Eskom requirements is attached in appendix G of this report).</p>	<p>John Geeringh (Pr Sci Nat), Senior Consultant Environmental Management, Eskom</p>	<p>29 September 2015, Email</p>	<p>Comment noted. The Project Applicant will adhere to Eskom requirements for work in or near Eskom servitudes. The applicant will also adhere to the setback distances required by Eskom for Solar PV Facilities from power lines and substations. These documents from Eskom are attached in Appendix G.</p>

3. Socio-economic issues

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
3.1	<p>My name is Lawrence Smith. I am the owner and founder of PROPTRANS NC. It is a start-up property and transport business based in Kenhardt. It has not done any business yet.</p> <p>I just want to know where will the employees of MULILO stay during the construction of the 7 plants around Kenhardt, will you need accommodation, is there any specifications for the accommodation, how many employees will need accommodation and what is the price that you are willing to pay for accommodation and transport to and from the plants.</p> <p>What is the value of the project and how do you register you as an interest party.</p>	<p>Lawrence Smith, Owner and founder PROPTRANS NC.</p>	<p>16 September 2015, Email</p>	<p>Comment noted. Very few workers will be accommodated on site. Mulilo will issue tenders in the local press for required services (including accommodation requirements) closer to construction to which Mr Smith will be able to respond. Mr Smith was added to the I&AP project database. Refer to Appendix C of this Scoping Report for a copy of the current database of I&APs.</p>
3.2	<p>Please let me know as to how the process works and</p>	<p>Myren C. Bock</p>	<p>10 September</p>	<p>Comment noted. The !Kheis Municipality IDP (2012 – 2017 and</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	how we as local youth and local entrepreneurs can benefit from this project.		2015, Email	<p>2015 – 2019) states that the objective to resolve this issue is to create an environment whereby the local community is empowered through capacity building and skills development (particularly for the youth). The proposed projects will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the DEA). It is estimated that between 60 and 90 skilled and 100 and 120 unskilled employment opportunities will be created during the construction phase. During the operational phase, approximately five skilled and seven unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.</p> <p>Therefore, the proposed solar energy facilities will provide advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.</p> <p>Employment opportunities will be advertised in the local press and through appropriate sources in the area to provide an opportunity for the local community (including the youth) to apply for jobs.</p>
3.3	<p>Hiermee wil ek Mnr I De wee kontrakteur van IR DE WEE T/A MHALO BUILDING CONSTRUCTION graag aansoek doen by MULILO son projekte soos aan adverteer in Die Gembok.</p> <p>Vir enige navrae of vorms wat ek moet in vul heg ek aan vir u my epos adres en my kontaknommer.</p>	Mr. I De Wee, IR De Wee T/A Mhalo Building Construction	28 September 2015, Email	Comment noted. A registration and comment form was emailed to Mr. De Wee. He has been added to the project I&AP database. Refer to Appendix C for a copy of the current database of I&APs. A copy of the BID and email notice (in English) was provided to Mr. De Wee via email.
3.4	<ul style="list-style-type: none"> • Work opportunities for community and will create less electricity issues for town. • If local contractors are also included in building 		15 October 2015, Email	Comments noted. The proposed projects will create employment opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>process then it will help source experience and create demand for skills in community.</p> <ul style="list-style-type: none"> Improved work opportunities locally 			<p>DEA). It is estimated that between 60 and 90 skilled and 100 and 120 unskilled employment opportunities will be created during the construction phase. During the operational phase, approximately five skilled and seven unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility. It should however be noted that employment during the construction phase will be temporary, whilst being long-term during the operational phase.</p> <p>Therefore, the proposed solar energy facilities will provide advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.</p> <p>Employment opportunities will be advertised in the local press and through appropriate sources in the area to provide an opportunity for the local community (including the youth) to apply for jobs.</p>



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 7:

Visual Impact Assessment

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LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
CPV	Concentrated Photovoltaic
DEA&DP	Department of Environmental Affairs and Development Planning
DEM	Digital Elevation Model
IDP	Integrated Development Plan
GIS	Geographic Information System
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
SDF	Spatial Development Framework
VIA	Visual Impact Assessment

GLOSSARY

Definitions	
Cumulative viewshed	A viewshed which indicates in some way how much of a development is visible from a particular viewpoint. In a raster based cumulative viewshed each pixel value will indicate how many points within the development area are visible. A power line development could, for example, use pylons as points to generate a cumulative viewshed for the development. Each pixel value in the viewshed will be a count (accumulation) of the number of pylons that will potentially be visible from that pixel.
Digital Elevation Model (DEM)	A digital or computer representation of the topography of an area.
Landscape baseline	A description of the existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA, 2002).
Landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape (GLVIA, 2002).
Landscape impacts	Change in the elements, characteristics, character and qualities of the landscape as the result of development (GLVIA, 2002). These effects can be positive or negative, and result from removal of existing landscape elements, addition of new elements, or the alteration of existing elements.
Sense of place	That distinctive quality that makes a particular place memorable to the visitor, which can be interpreted in terms of the visual character of the landscape. The unique quality or character of a place, whether natural, rural or urban. Relates to uniqueness, distinctiveness or strong identity (Oberholzer 2005).
Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.
Viewshed	A viewshed is an area of land, water, and other environmental elements that is visible from a fixed vantage point. In digital imaging, a viewshed is a binary raster indicating the visibility of a viewpoint for an area of interest. A pixel with a value of unity indicates that the viewpoint is visible from that pixel, while a value of zero indicates that the viewpoint is not visible from the pixel.
Visual exposure	Visual exposure refers to the relative visibility of a project or feature in the landscape (Oberholzer, 2005). Exposure and visual impact tend to diminish exponentially with distance.
Visual impact assessment	A specialist study to determine the visual effects of a proposed development on the surrounding environment. The primary goal of this specialist study is to identify potential risk sources resulting from the project that may impact on the visual environment of the study area, and to assess their significance. These impacts include landscape impacts and visual impacts.
Visual intrusion	Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer 2005).
Visual receptors	Visual receptors include viewer groups such as the local community, residents, workers, the broader public and visitors to the area, as well as public or community areas from which the development is visible.
Visual resource	Visual resource is an encompassing term relating to the visible landscape and its recognisable elements which, through their coexistence, result in a particular landscape and visual character

EXECUTIVE SUMMARY

The Visual Impact Assessment specialist study compiled for the proposed 75 MW Boven Solar PV4 Photovoltaic (PV) plant near Kenhardt, Northern Cape, was conducted by Henry Holland.

The landscape surrounding the proposed site has a rural agricultural character which has been transformed by extensive stock farming and large scale infrastructure in the form of the Sishen-Saldanha ore railway line and Eskom Nieuwehoop Substation (currently being constructed).

The following sensitive visual receptors will potentially be affected by the introduction of a large PV plant into the landscape:

- Residents and viewpoints on farms surrounding the proposed development site. These are highly sensitive visual receptors since they have an active interest in their surrounding landscape; and
- Motorists using the R383 and the Transnet Service Road adjacent to the ore railway line. Motorists are classified as low sensitivity visual receptors since they pass through the landscape and their attention is mostly focused on the road.

There are very few highly sensitive visual receptors that will experience high visual exposure. These will be viewpoints on surrounding farms rather than farmsteads..

Visual intrusion will be moderate for visual receptors on surrounding farms since the landscape is already transformed by existing structures, but the proposed Solar PV facility will be clearly noticeable.

Motorists using the gravel road adjacent to the Sishen-Saldanha railway line will experience low visual intrusion since their views are already impacted severely by the railway line and other large structures in the landscape.

The significance of the potential visual impact of construction activities on existing views of sensitive visual receptors will be moderate before mitigation since the consequence of the impact is substantial but its duration is short to medium term and very few highly sensitive visual receptors will be affected. Phasing preparation of the solar field area and construction of the solar field in such a way as to minimise the area of soil exposed and the duration for which it will be exposed will, among other mitigation measures discussed in the report, lower the consequence of the visual impact resulting in a low significance.

The significance of the impact that the development will potentially have on the landscape during the operational phase is rated as very low (without mitigation) since the impact is long term and regional in nature since the consequence of the impact is slight. The consequence of the landscape impact is rated as slight since the landscape is already impacted by the railway line and substation, and is not a typical rural agricultural landscape in this region.

The significance of the visual intrusion of the development (during the operational phase) on the views of sensitive visual receptors is rated as low moderate (without mitigation) since very few sensitive visual receptors are likely to be affected by the proposed development the consequence of the impact is substantial and it's probability of occurrence is likely. The consequence of the impact is expected to be

moderate, its duration long term, its probability likely and its extent regional. Due to the size of the development, mitigation measures are unlikely to lower the consequence of the impact enough to lower its significance. Successful mitigation will lower the consequence to moderate and the significance of the impact to low. Mitigation measures include rehabilitation of temporary cleared areas, management of dust generation, maintaining structures and painted surfaces and using appropriate colours for buildings and structures in order for them to better blend in with the background landscape (where technically feasible).

The significance of the potential impact of night lighting of the development on the nightscape of the region is rated as very low since very few sensitive visual receptors are likely to be affected and the risk of adding to light pollution of the region is low (if mitigation measures are followed). The Eskom Nieuwehoop Substation is likely to dominate the nightscape. The impact will be local and its consequence slight. Mitigation measures focus on a management plan that will minimise nightscape impacts, and include aspects such as lighting no more than is required for safety and security, avoiding uplighting, glare and light spill.

The significance of the potential visual impact of decommissioning activities is moderate before mitigation since these activities are very similar to construction activities but should be shorter in duration. Mitigation measures should lower the significance of the impact to low.

The cumulative landscape impact of various solar energy and electrical infrastructure projects in the surrounding landscape will have a slight consequence since the landscape character has been extensively altered by the railway line and Nieuwehoop Substation. The significance of the cumulative impact will be very low since the substation and power lines will transform the landscape prior to the construction and operation of the solar energy facilities.

The significance of the cumulative visual impact on existing views of sensitive visual receptors is rated as very low since it is unlikely that there are any views of scenic value that have not already been impacted by the railway line and Nieuwehoop Substation. Once solar energy facilities such as those proposed for the region are in views already the addition of another in the same region will have low intrusion on views since solar fields will be a common element of views. The other facilities proposed for the region are in close proximity to the site proposed for the Boven Solar PV4 facility and they are all in close proximity to the railway line and substation. Very few visual receptors are likely to be affected and Kenhardt lies outside all of the viewsheds for these proposed facilities. Game farms are either outside all viewsheds or some parts will experience low visual exposure only. The R27, a route used by tourists visiting the Orange River tourist attractions, is more than 10 km from the nearest proposed facility.

The area proposed for this project falls within a renewable energy development zone (REDZ7 – Upington Solar) as identified in the National Strategic Environmental Assessment for renewable energy developments and is therefore seen on a regional scale as an appropriate area for solar energy developments. On a local scale the visually disturbed landscape surrounding the Nieuwehoop Substation and the low number of highly sensitive visual receptors that will potentially be affected, makes this an ideal area to locate the Boven Solar PV4 facility.

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R982	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain-	Appendix A of EIA Report
a) details of-	
i. the specialist who prepared the report; and	
ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix B of EIA Report
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 7.1.1
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 7.1.3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 7.1.3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 7.3
g) an identification of any areas to be avoided, including buffers;	Section 7.3
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 7-1 and Section 7.3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1.4
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	Section 7.7
k) any mitigation measures for inclusion in the EMPr;	Section 7.9
l) any conditions for inclusion in the environmental authorisation;	None
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7.9
n) a reasoned opinion-	Section 7.10
i. as to whether the proposed activity or portions thereof should be authorised; and	
ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	None
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 7.5.1
q) any other information requested by the competent authority.	None

7 VISUAL IMPACT ASSESSMENT

This chapter presents the findings of the Visual Impact Assessment that was prepared by Mr. Henry Holland as part of the EIA for the proposed Boven Solar PV4 project within the Northern Cape Province.

7.1 INTRODUCTION AND METHODOLOGY

7.1.1 Scope and Objectives

As noted in Chapter 1 of this EIA Report, the proposed project includes the development of a 75 Megawatt (MW) Solar Photovoltaic (PV) Facility (referred to as Boven Solar PV4) on the remaining extent of Boven Rugzeer Farm 169. The farm is located 30 km north-east of Kenhardt and 80 km south of Upington within the Kheis Local Municipality, Northern Cape Province. As noted above, this Visual Impact Assessment is being undertaken as part of the requisite EIA Process. The overall scope and objectives of this Visual Impact Assessment are to:

- Determine the current conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Identify potential impacts that may occur during the construction, operational and decommissioning phases of development, as well as impacts associated with future environmental changes if the “no-go” option is implemented (both positive and negative);
- Assess the impacts, in terms of direct, indirect and cumulative impacts;
- 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; and
- Incorporate and address all issues and concerns raised by I&APs and the public.

7.1.2 Terms of Reference

The Terms of Reference for the Visual Impact Assessment (VIA) are as follows:

- Review detailed information relating to the project description and precisely define the environmental risks to the landscape and the risks to sensitive viewers, as well as the consequences thereto.
- Conduct a site visit and undertake a Photographic Survey of the surrounding region from which the landscape and visual baselines can be prepared.
- Compile a baseline description of the visual character/baseline and the landscape of the affected area.
- Undertake data preparation and the visibility analysis, which includes the calculation of viewsheds for various elements of the proposed development. Identify principal viewpoints and sensitive visual receptors.
- Identify and rate potential direct, indirect and cumulative impacts on the landscape and on sensitive viewers/receptors for the construction, operation and decommissioning phases of the proposed project. Study the cumulative impacts of the project by considering the impacts of existing industries within the area, together with the impact of the proposed project.

- Provide input to the Environmental Management Programme (EMPr), including mitigation and monitoring requirements to ensure that the visual impacts on the principal viewpoints and sensitive viewsheds are mitigated.
- Compile an assessment report (i.e. this report) qualifying the results of the fieldwork, risks and potential visual impacts, and impact evaluations, including potential mitigation measures, monitoring requirements as well as relevant recommendations.

7.1.3 Approach and Methodology

This VIA is based on guidelines for visual assessment specialist studies as set out by South Africa's Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) (Oberholzer, 2005), as well as guidelines provided by the Landscape Institute of the UK (GLVIA, 2002).

A visibility analysis was conducted for the region surrounding the proposed development site and components of the development relevant to the assessment of the potential visual impact (10 km radius) to identify key representative viewpoints and sensitive visual receptors. A site visit and photographic survey of this region followed to establish a baseline for visual resources to compare the proposed developments against. Spatial Development Frameworks (SDF) and Integrated Development Plans (IDP) for the relevant municipalities were studied to align the VIA with municipal objectives in terms of landscape and visual resources.

The key steps followed in the VIA are presented below:

Site Visit and Photographic Survey

The field survey (conducted on 23-25 October 2015) provided an opportunity to:

- Determine the actual or practical extent of potential visibility of the proposed development, by assessing the screening effect of landscape features;
- Conduct a photographic survey of the landscape surrounding the development;
- Take photos for use in photomontage images;
- Identify sensitive landscape and visual receptors;
- Viewpoints were chosen using the following criteria:
 - High visibility – sites from where most of the solar facility will be visible;
 - High visual exposure – sites at various distances from the proposed site; and
 - Sensitive areas and viewpoints such as nature reserves and game farms from which turbines will potentially be seen.
- Additionally, photo sites were chosen to aid in describing the landscape surrounding, and potentially affected by, the proposed development.

Field work was conducted in spring but seasonal differences in vegetation cover and atmospheric conditions are slight and contrasts in texture and colour between development structures and landscape background will not change enough due to seasonal changes to invalidate this assessment.

Landscape Description

A desktop study was conducted to establish and describe the landscape character of the receiving environment. A combination of data analysis using a Geographic Information System (GIS), literature review and photographic survey was used to identify land cover, landforms and land use in order to gain an understanding of the current landscape within which the development will take place (GLVIA 2002). Areas of scenic interest, potential sensitive receptors (viewpoints, residences), preliminary zone of visual influence, and principal representative viewpoints were also identified. Landscape features of special interest were identified and mapped, as were landscape elements that may potentially be affected by the development.

Visual Impact Assessment

A GIS ([TNTmips¹](http://www.microimages.com/products/tntmips.htm)) is used to calculate viewsheds for various components of the proposed development. The viewsheds and information gathered during the field survey were used to define criteria such as visibility, viewer sensitivity, visual exposure and visual intrusion for the proposed development. These criteria were, in turn, used to determine the intensity of potential visual impacts on sensitive viewers. All information and knowledge acquired as part of the assessment process was then used to determine the potential significance of the impacts according to the standardised rating methodology as described in Chapter 4 of the EIA Report for the project.

7.1.4 Assumptions and Limitations

7.1.4.1 Assumptions

Mitigation Measures

Mitigation measures in this report will assume that construction activities are managed and performed in such a way as to minimise its impact on the receiving environment. The following assumptions, in particular, apply since they are relevant to minimising visual impact during the construction phase:

- The contractor will maintain good housekeeping on site to avoid litter and minimise waste;
- Project developers will demarcate construction boundaries and minimise areas of surface disturbance;
- Vegetation and ground disturbance will be minimised and take advantage of existing clearings;
- Construction of new roads will be minimised and existing roads will be used where possible;
- Topsoil from the site will be stripped, stockpiled, and stabilised before excavating earth for the construction of the facility;
- Vegetation material from vegetation removal will be mulched and spread over fresh soil disturbances to aid in the rehabilitation process;
- Plans will be in place to control and minimise erosion risks;
- Plans will be in place to minimise fire hazards and dust generation; and
- Plans will be in place to rehabilitate cleared areas as soon as possible.

Cumulative Impacts

Cumulative impacts are assessed by adding expected impacts from this proposed development to existing and proposed developments with similar impacts in a 20 km radius (of the proposed Kenhardt PV projects). The existing and proposed developments that were taken into consideration for cumulative impacts include (CSIR 2015):

- Nieuwehoop 400/50 kV Substation located in close proximity to the proposed Solar Energy Facility (under construction);
- 2 x 400 kV power lines from Aries to the Solar Concentrated Solar Power (CSP) near Upington (under construction);
- 400 kV power line from Nieuwehoop Substation to the Solar CSP near Upington;
- Proposed Scatec Solar Kenhardt PV projects (i.e. Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3);
- Proposed 132 kV Transmission Line to connect the proposed 75 MW Solar PV Facility (Kenhardt PV 1) to the Eskom Nieuwehoop Substation (i.e. Kenhardt PV 1 – Transmission Line);
- Proposed 132 kV Transmission Line to connect the proposed 75 MW Solar PV Facility (Kenhardt PV 2) to the Eskom Nieuwehoop Substation (i.e. Kenhardt PV 2 – Transmission Line);
- Proposed 132 kV Transmission Line to connect the proposed 75 MW Solar PV Facility (Kenhardt PV 3) to the Eskom Nieuwehoop Substation (i.e. Kenhardt PV 3 – Transmission Line);

¹ <http://www.microimages.com/products/tntmips.htm>

- Proposed Mulilo Renewable Project Developments (Pty) Ltd Solar PV projects: Phase 2 (i.e. Boven Solar PV 1 (on the remaining extent of the Farm Boven Ruzzeer 169, Kenhardt), Gemsbok Solar PV 1 (on the remaining extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt) and Gemsbok Solar PV 2 (on the remaining extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt));
- Proposed Mulilo Renewable Project Developments (Pty) Ltd Solar PV projects: Phase 2 (i.e. seven 75 MW PV OR Concentrated PV Solar Energy Facilities and associated infrastructure near Kenhardt); and
- Proposed Strausheim Solar project (initial phases of EIA Process).

All the developments that have been considered in the assessment of cumulative impacts are also listed in Chapter 4 of the EIA Report.

7.1.4.2 Limitations

Spatial Data Accuracy

Spatial data used for visibility analysis originate from various sources and scales. Inaccuracy and errors are therefore inevitable. Where relevant these will be highlighted in the report. Every effort was made to minimize their effect.

Viewshed Calculations

Calculation of the viewsheds does not take into account the potential screening effect of vegetation and buildings. Due to the relatively low vegetation cover in the region and the size and extent of the solar energy facility, the screening potential of vegetation is likely to be minimal over most distances.

Viewsheds are calculated using Digital Elevation Model (DEM) which is derived from 1:50000 scale contour lines with a 20 m vertical distance between contours. The DEM has a pixel resolution of 20 m x 20 m and covers a 70 km x 30 km area (within which a study area is located at 10 km radius around the development site).

7.1.5 Source of Information

The VIA is based on the following information:

- Documentation supplied by the client and the CSIR;
- Digital topocadastral data at 1:50 000 scale from the National Geo-spatial Information database²;
- 1:250000 Geology map sheets covering the region;
- Google Earth software and data;
- South African digital land cover dataset of 2002;
- Renewable Energy EIA Application Database for SA, 2015 Quarter 3³;
- Protected Areas Data Release - Third Quarter 2015³;
- Eskom SPOT Building Count data set (de la Rey 2008); and
- 2013 Garmin map data for 'points of interest' layer.

7.1.6 Declaration of Independence of Specialist

Refer to Appendix A of this EIA Report for the Curriculum Vitae of Mr. Henry Holland, which highlights his experience and expertise. The declaration of independence by the specialist is provided in Box 7.1 below and included in Appendix B of this EIA Report.

² <http://www.ngi.gov.za>

³ <http://egis.environment.gov.za/frontpage.aspx?m=27>

BOX 7.1: DECLARATION OF INDEPENDENCE

I, Henry Holland, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Boven Solar PV4 Project, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



HENRY HOLLAND

7.2 DESCRIPTION OF PROJECT ASPECTS RELEVANT to VISUAL IMPACTS

This section describes the aspects of the proposed project that are relevant in terms of potential visual impacts.

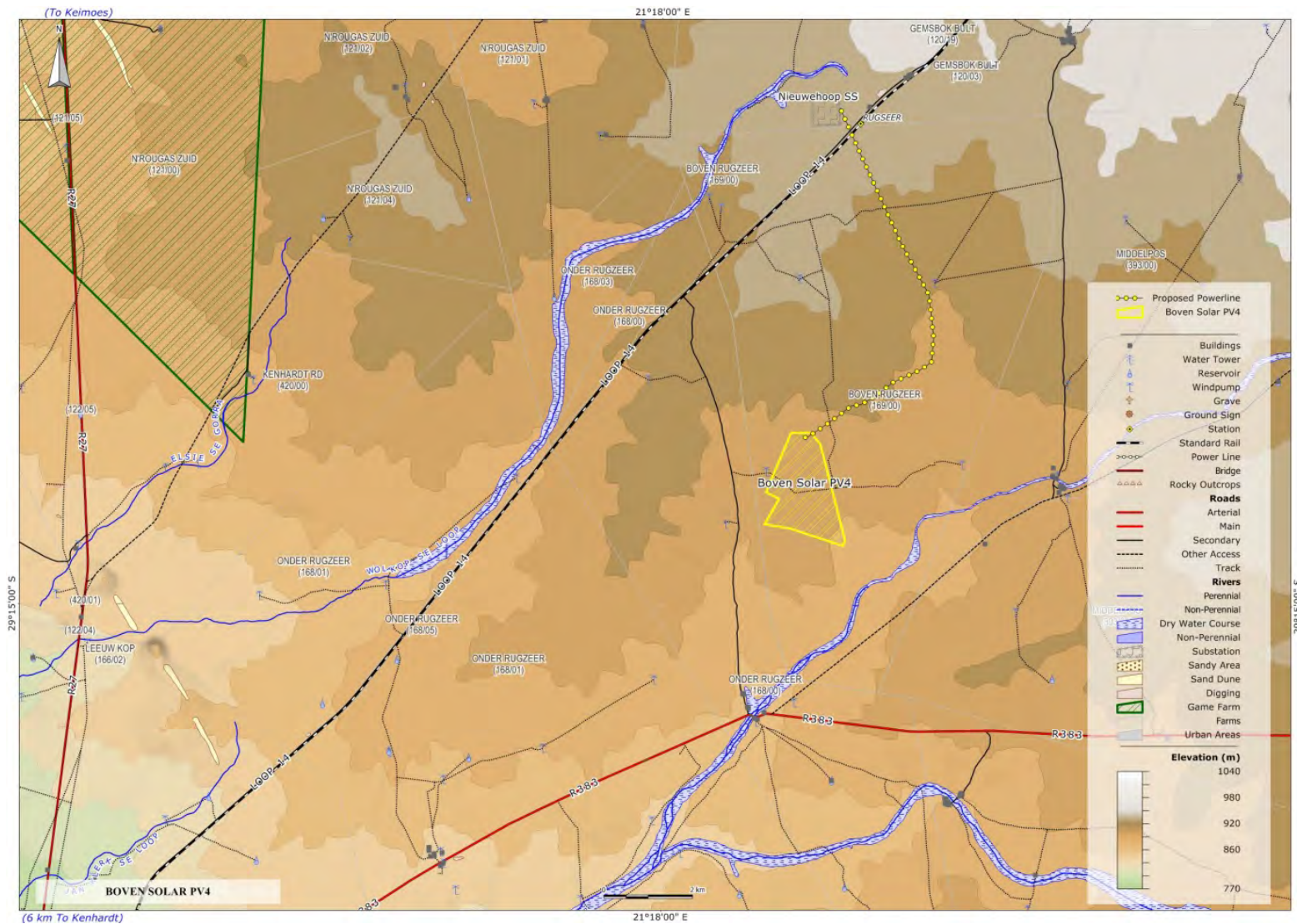


Figure 7-1: Proposed Boven Solar PV4 project site.

7.2.1 Construction and Decommissioning Phases

It is likely that all or most components of the proposed PV plant will contribute to potential visual impact during the construction and decommissioning phases. Elements of the construction and decommissioning phases that will have a potential visual impact include:

- A large area will be cleared of vegetation to host the solar field and associated buildings and structures;
- Laydown areas for equipment will also be required, although these will be temporary;
- Access roads, maintenance roads and power line servitudes will require clearing of vegetation. Exposure of large tracts of soil or rock will contrast significantly with the existing mottled landscape;
- Soil stockpiles and removed vegetation heaps will be visible;
- Alien invasive plant species may contrast strongly with surrounding vegetation;
- An increase in human activity in a remote area is likely to be noticed even by only a small number of visual receptors. Construction of the various components will require a large number of workers. Relatively large construction equipment and vehicles will be operating during these phases of development, and an increase in traffic on roads in the region is likely;
- Exposure of large areas of soil, and worker and equipment traffic will increase dust generation which will increase construction visibility;
- Buried pipelines and cables will not be visible during the operational phase, but activity, equipment and soil heaps will be visible during construction; and
- Construction or improvement of access roads will be more visible than the operational roads.

Construction of the proposed power line for the PV plant will potentially cause visual intrusion on existing views of sensitive visual receptors through the following activities:

- Some construction activities will potentially be exposed above the skyline due to the height of the pylons, and as such it is likely to be more intrusive on views;
- Laydown areas for equipment will be required, although these will be temporary;
- Access roads, maintenance roads and power line servitudes will potentially require clearing of vegetation;
- Soil stockpiles and removed vegetation heaps will be visible;
- Alien invasive plant species may contrast strongly with surrounding vegetation;
- An increase in human activity in a remote area is likely to be noticed even by only a small number of visual receptors. Relatively large construction equipment and vehicles will be operating during these phases of development, and an increase in traffic on roads in the region is likely;
- Exposure of large areas of soil, and worker and equipment traffic will increase dust generation which will increase construction visibility; and
- Construction or improvement of access roads will be more visible than the operational roads.

7.2.2 Operational Phase

Elements of the proposed project that will potentially cause significant visual impact during the operational phase include (**maximum heights were used in the analyses to model a worst case scenario**):

- Solar field – solar panels of up to 10 m high. The solar field covers a large area and is likely to contrast strongly with surrounding or background vegetation, particularly when viewed from elevated positions;
- Converter station and operations buildings (i.e. operational and maintenance control centre, offices, workshop/warehouse, operations office etc.) (7 m high);

- On-site substation (up to 30 m high) and 132 kV overhead distribution line (30 m high) – these are likely to extend above the skyline for some visual receptors in the surrounding area;
- Security fencing (3 m high) and the guard cabin/house (3 m high). From some viewing angles the fence is more visible than the panels;
- Buildings and ancillary structures will likely contrast strongly with the solar field due to colour differences as well as the fact that most structures are taller than the solar panels; and
- Security and exterior lighting around buildings and parking areas could add to light pollution in the region.

Table 7-1 Heights of components used in viewshed analysis

Component	Maximum Height
Solar Panels	10 m
Inverter Stations	4 m
Operations Buildings	7 m
On-site Substation and 132 kV power line	30 m
Security Fencing	3 m
Guard Cabin	3 m

It is important to note that a complete, detailed project description is included in Chapter 2 of the EIA Report.

7.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The topography in the region surrounding the proposed development site is relatively flat with low open hills (Figure 7-2). Outcrops of erosion resistant rocks form occasional steep low hills which are distinctive in the landscape and often form a distant backdrop to views. The Hartbees River, a tributary of the Orange River, passes just south of Kenhardt. Wolfkop Se Loop and Rugseer River are tributaries of the Hartbees River which pass through the study area (Figure 7-3b and c). Rivers in this region only flow during heavy rain and are normally dry riverbeds.

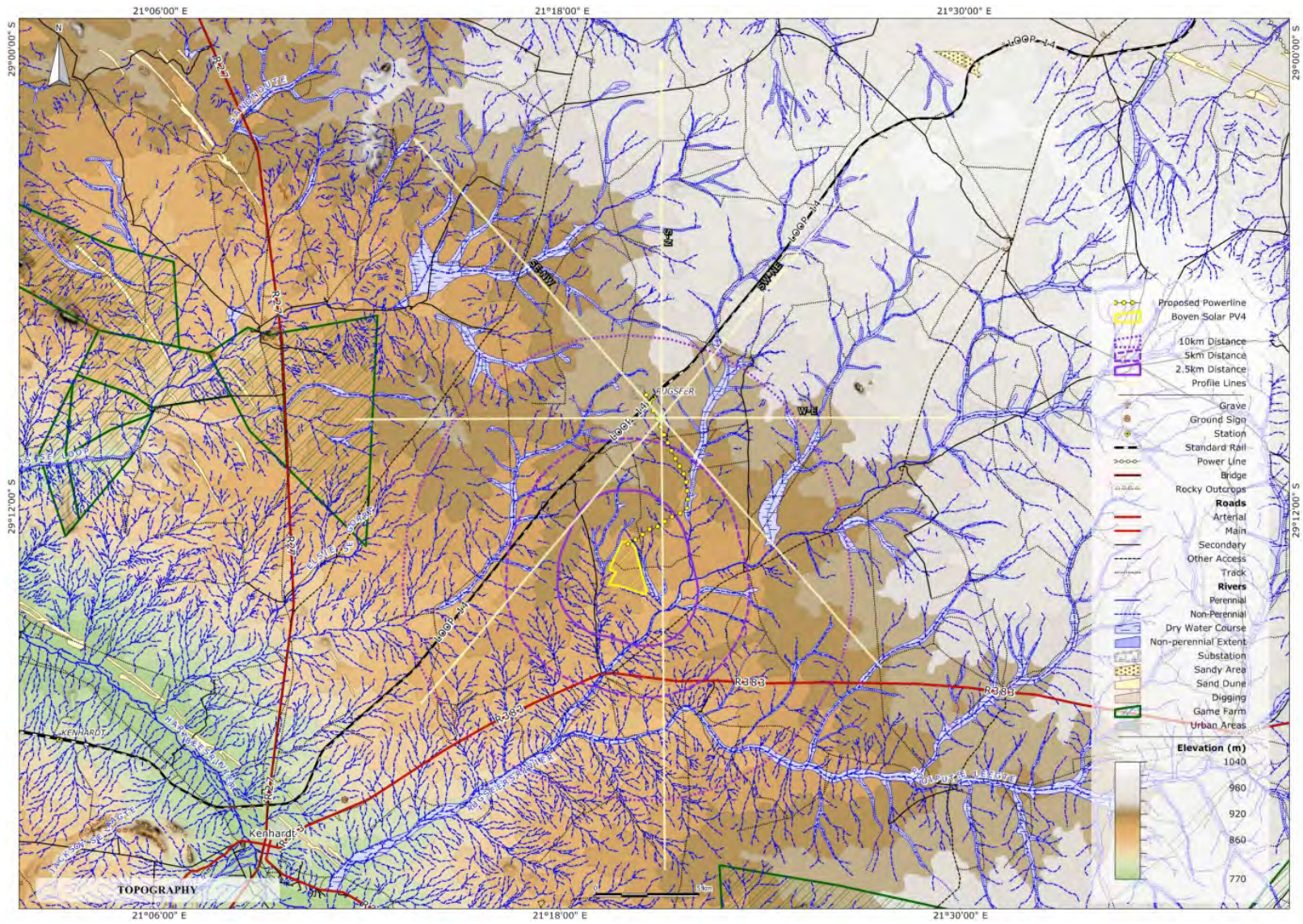


Figure 7-1:
Topographic map of
the region.

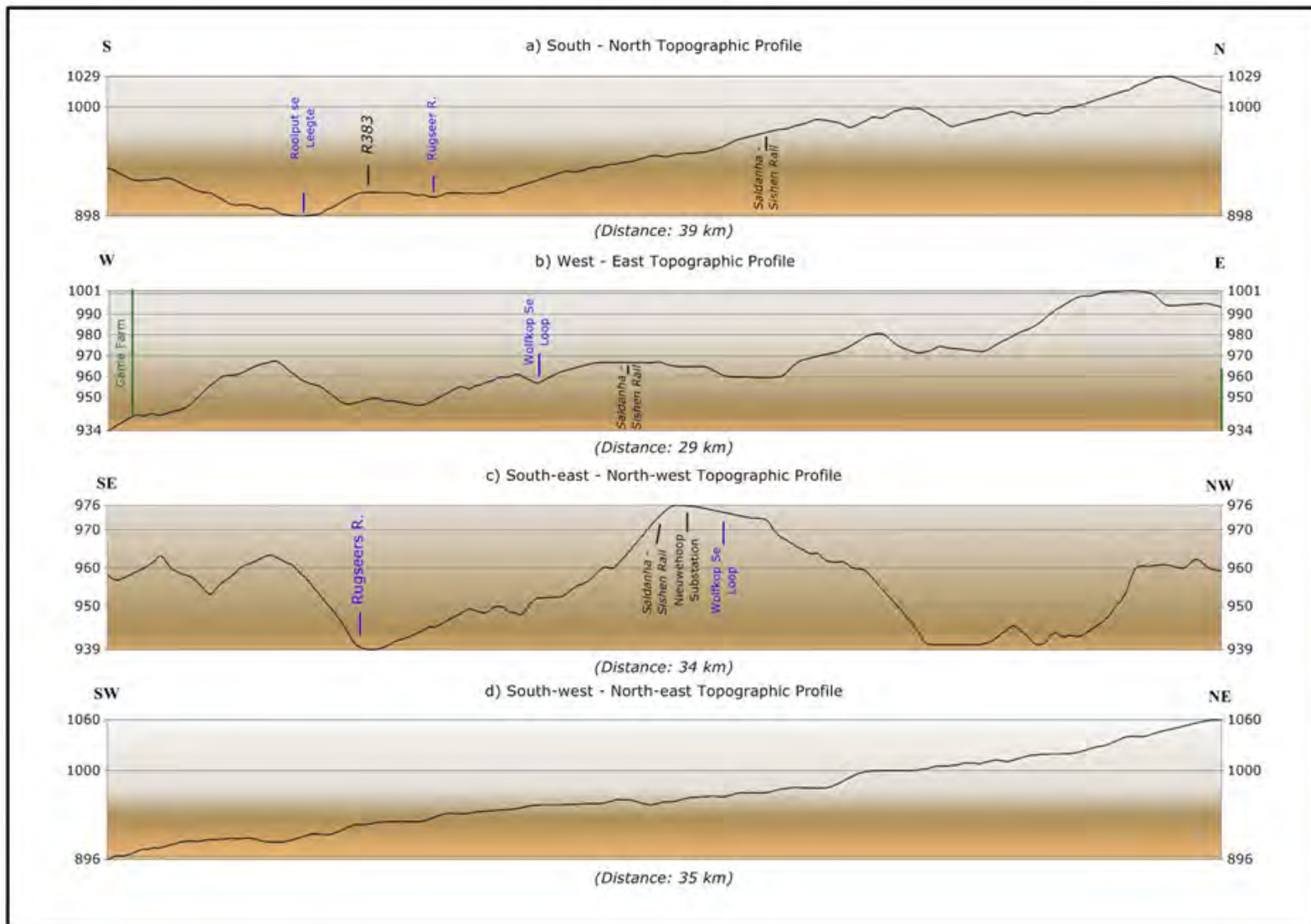


Figure 7-2 a) South-North Topographic Profile, b) East-West Topographic Profile, c) South-east – North-west Topographic Profile, d) South-west – North-east Topographic Profile. Topographic profiles as indicated on the topographic map above.

The geological history of the region is complex with multiple metamorphic and deformation events (Figure 7-4). The region is therefore underlain by sedimentary and igneous rocks which were transformed into their metamorphic equivalents. The study area is located on migmatite (Kenhardt Migmatite) which is mostly overlain by more recent sediments of the Gordonia Group (Kalahari sands). A large number of pegmatites are found in the region and in some cases are mined for semi-precious stones. The steep, dark coloured hills around Kenhardt are quartzites which are relatively erosion-resistant rocks.

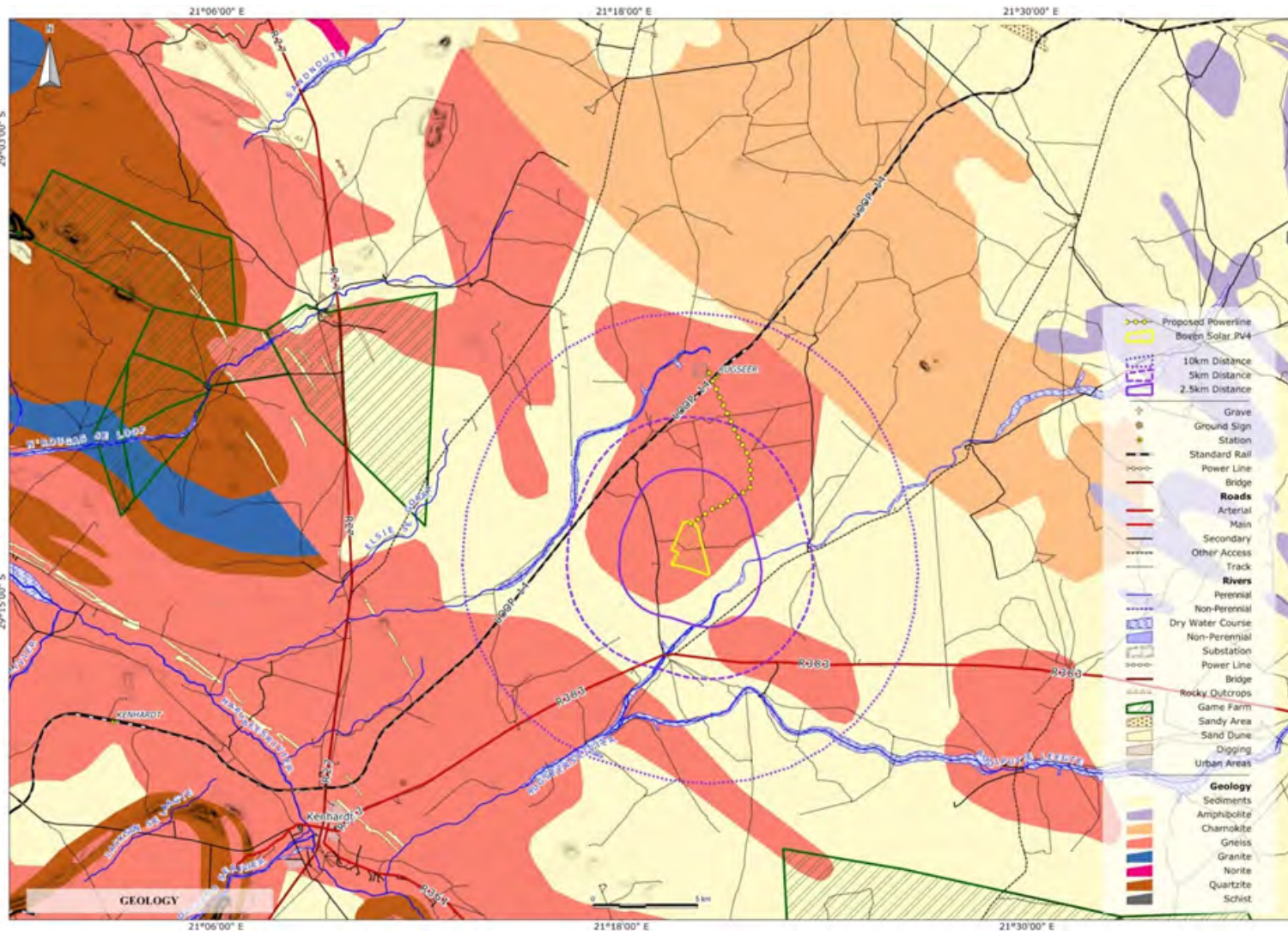


Figure 7-3 Simplified geology of the region.

The study area is covered in grassland with low shrubs (Bushmanland Arid Grassland) which has been transformed by live-stock grazing (Figure 7-5). Sheep farming is the main agricultural activity. The vegetation produces a mottled background to most views which is relatively effective at making some development types such as power lines and pylons blend in with the background. There are no protected areas in the region and none are planned by the ZF Mgcawu District Municipality (Siyanda DM 2012) but there are a number of game farms in the surrounding landscape.

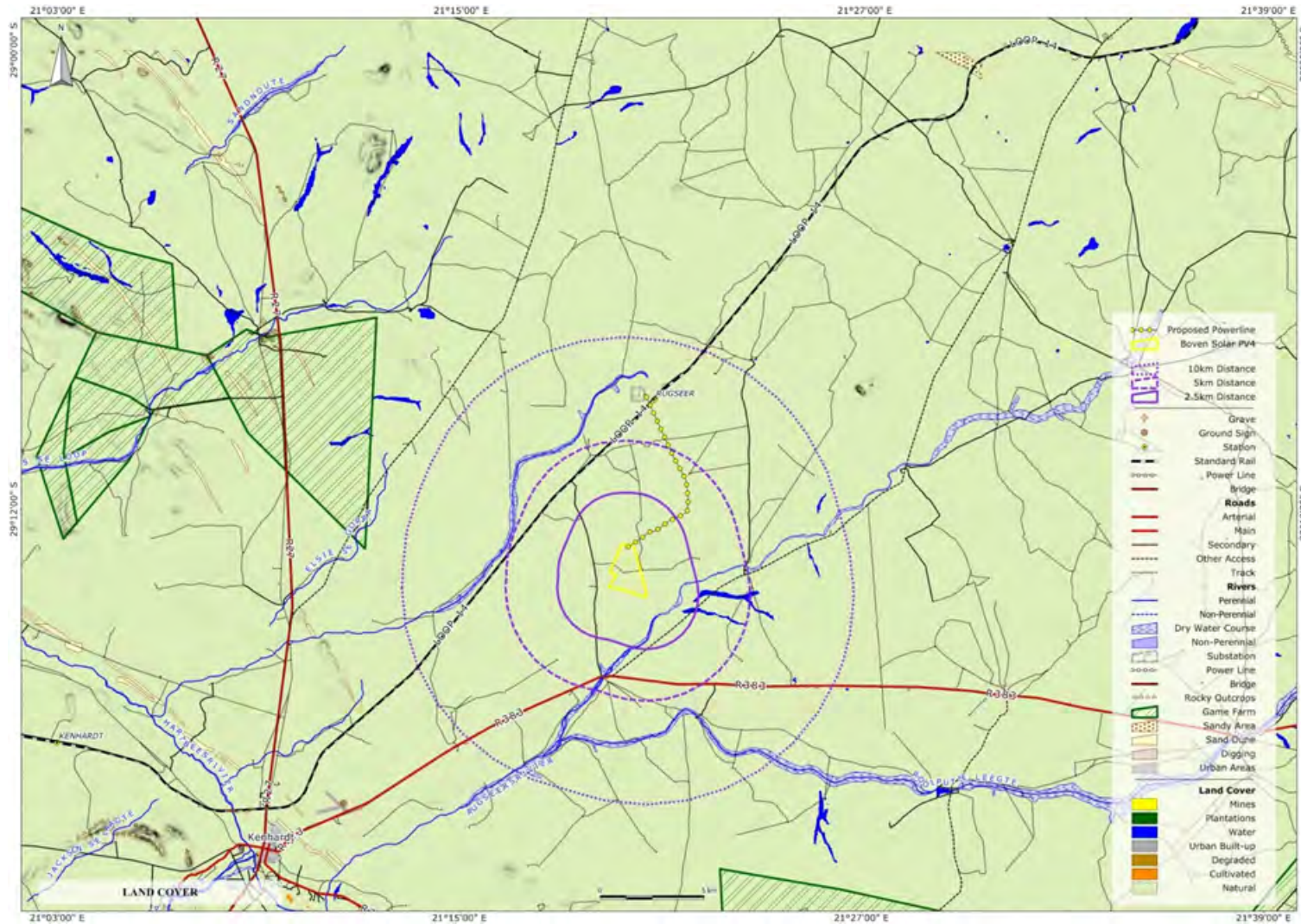


Figure 7-4 Land cover map of the region.

Kenhardt provides a service centre for the surrounding agricultural community (Figure 7-6). It is located approximately 30 km south-west of the proposed development site on the R27 provincial road. The road is often used by motorists travelling from Cape Town to the Northern Cape tourist destinations along the Orange River. The R383 is a gravel road between Kenhardt and Marydale. The Sishen-Saldanha railway passes through the property on which the proposed PV plant will be built and is a major feature in the landscape. A private (Transnet) gravel road runs adjacent to the rail tracks and provides limited access to the proposed site. A railway siding, Rugseer, is located near the proposed project site. The Eskom Nieuwehoop Substation is being constructed on a site just west of the Rugseer siding. Proposed 400 kV transmission lines from Ferrum Substation near Upington and from Aries Substation southwest of Kenhardt will connect to Nieuwehoop Substation and will potentially become highly visible features of the landscape.

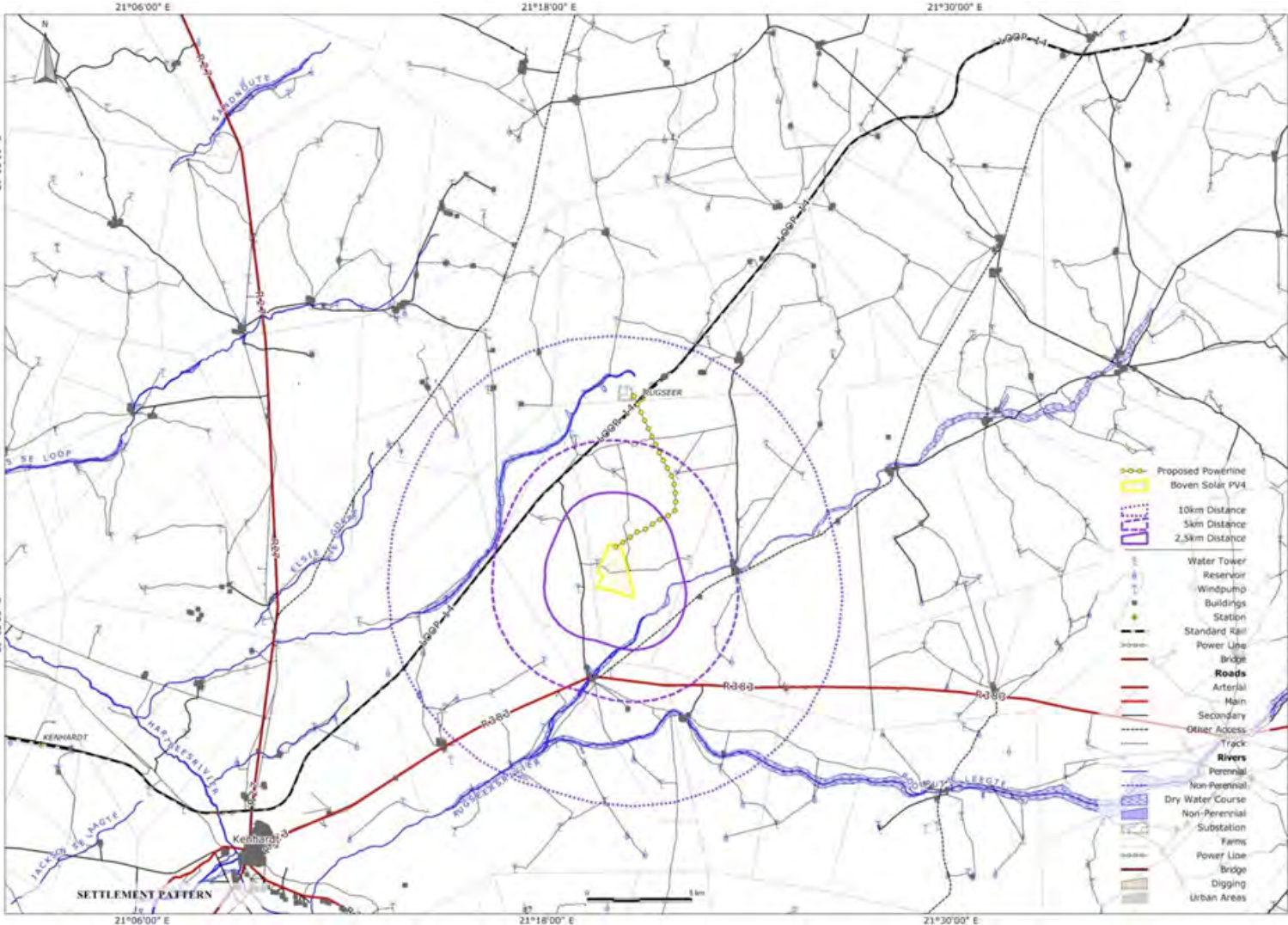


Figure 7-5 Prominent man-made structures and settlement patterns in the landscape.

The landscape surrounding the proposed site has a rural agricultural character. It is in a remote part of the country and is sparsely populated, but it has been transformed to some extent by extensive stock farming as well as by large scale infrastructure in the form of the Sishen-Saldanha ore railway line.

The topography and vegetation of the region is such that opportunities for screening the proposed development from public views are very limited. Changes in the layout of the PV plant are unlikely to reduce the visibility of the plant significantly. The Transnet road adjacent to the Sishen-Saldanha ore railway line will bring motorists into areas where they will be highly exposed to the proposed development (i.e. in close proximity to the PV plant). However, there are very few motorists using this road – it is a private road that belongs to Transnet but it is also used by farmers to access their properties.

In light of the above there are no specific areas on the proposed site that should be avoided in terms of visual considerations.

7.4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The following legislation and local and district municipal plans are applicable to the proposed project:

- The National Environmental Management Act (NEMA) and the Regulations in terms of Chapter 5 of NEMA (Act 107 of 1998);
- The Protected Areas Act (PAA) (Act 57 of 2003, Section 17) which refers to the conservation and protection of natural landscapes;
- The Provincial Spatial Development Framework for the Northern Cape (Office of the Premier of the Northern Cape 2012) - The PSDF identifies a Solar Corridor where solar projects will be given priority – the Kenhardt PV 1 project does not fall within this corridor;
- ZF Mgcawu SDF (Siyanda DM 2012) – The Solar Corridor is seen as an initiative that “*should be pursued vigorously.*” The corridor follows the main routes from Prieska to Upington and further along the N10 although the SDF map on p.221 of the SDF the corridor is extended along the N14 west. There are also a number of solar energy projects outside these corridors. Proposal SB7 for Southern Bushmanland relates to solar projects: “*Sensitively place solar projects within the Solar Corridor with due regard to the visual impact of these facilities and the siting principles in Section 6.3.7.*” Siting principles address wind farms rather than solar plants;
- !Kheis Rural SDF (!Kheis Municipality 2014) – Natural scenic beauty of the municipality and production of solar energy are both seen as opportunities based on its existing bio-physical conditions. Tourism opportunities for this municipality potentially relevant to the proposed development include agricultural tourism, landscape tourism and game farms. Solar energy projects are suggested for the remote areas of the municipality although no indication is given where this should be (other than the Solar Corridor);
- Kai !Garib SDF (Kai !Garib Municipality 2012) – Kenhardt and its surrounding rural area is seen as an agricultural region with a scenic environment and important cultural heritage. Dust pollution is seen as a factor that “*must be taken into consideration with future developments.*” Solar projects are mainly located along the Orange River and within the Solar Corridor, but there are projects south-west of Kenhardt indicated on the resources map. This is presumably the Aries solar plant;
- Renewable Energy Development Zones (REDZ) (CSIR 2014) – The Boven Solar PV4 project is located in REDZ 7 – Upington Solar which was identified by the Strategic Environmental Assessment (SEA) as a potential development zone for solar energy. Landscape and visual specialists were involved in the Scoping Assessments of the Focus Areas.

7.5 IDENTIFICATION OF KEY ISSUES

7.5.1 Key Issues Identified During the Scoping Phase

The potential visual issues identified during the Scoping Phase of this EIA Process include:

- Construction Phase: Visual intrusion of construction activities on existing views of sensitive visual receptors in the surrounding landscape.
- Construction Phase: Visual intrusion of a large area cleared of vegetation on the existing views of sensitive visual receptors;
- Construction Phase: Visual impact of night lighting during the construction phase on the nightscape of the region;
- Operational Phase: Landscape impact of introducing a large solar plant into a remote rural landscape;
- Operational Phase: Visual intrusion of a large solar field on the existing views of sensitive visual receptors;
- Operational Phase: Visual intrusion of tall, relatively large structures on the existing views of sensitive visual receptors; and
- Operational Phase: Visual impact of night lighting of the proposed development on the relatively dark rural nightscape.

The Scoping Report was released for a 30-day comment period which extended from 23 October 2015 to 24 November 2015. To date, no specific comments have been raised by I&APs that relate to visual impacts.

7.5.2 Identification of Potential Impacts

Features at risk of impact in a VIA are the landscape and sensitive visual receptors in the landscape.

7.5.2.1 *Landscape*

A landscape impact occurs when a development alters the existing landscape character. If the landscape character is highly sensitive to the development type then the intensity of the impact will be high. A high intensity landscape impact, for instance, will be highly significant if the landscape character type is scarce as well as highly valued by the community (local, regional, national and international). The landscape impact does not depend only on the existing sensitive visual receptors since it can also affect future visual receptors and communities beyond the local or regional context.

As noted above, the existing landscape character of the surrounding region is rural-agricultural with large scale infrastructure such as the Sishen-Saldanha railway and the Eskom Nieuwehoop Substation. The remote sense of place has been severely impacted by the railway, Rugskeer Siding and substation. As a result the landscape character has a low sensitivity to the proposed development.

7.5.2.2 *Sensitive Visual Receptors*

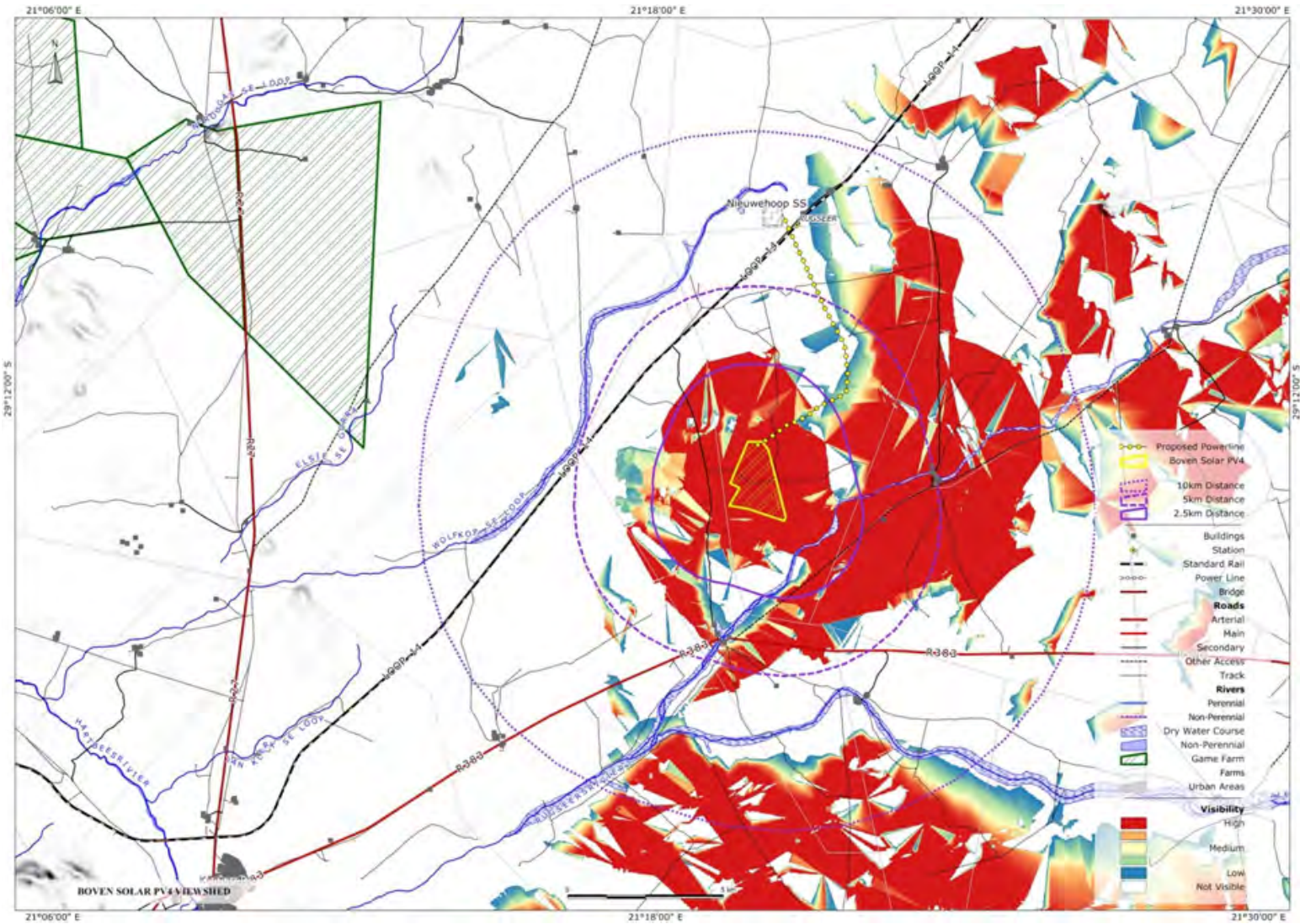


Figure 7-6 Viewshed of the proposed Boven Solar PV4 facility.

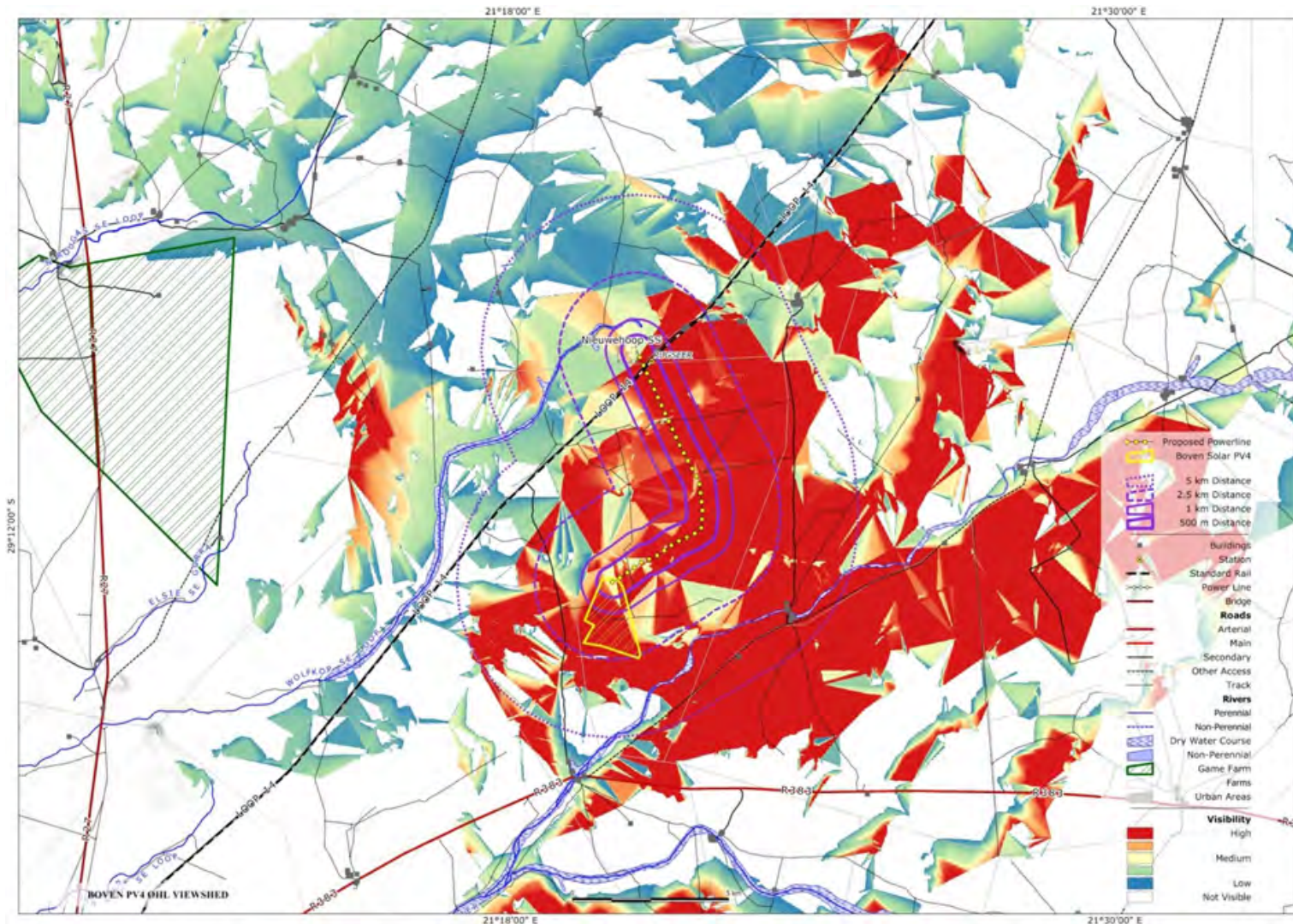


Figure 7-7 Viewshed of the proposed 132 kV power line from Boven Solar PV4 to the Nieuwehoop Substation.

The viewshed maps (Figure 7-7 and Figure 7-8) show that potentially affected sensitive visual receptors are mainly limited to farmsteads, dwellings and viewpoints on farms surrounding the proposed sites. Motorists using the R27 are unlikely to have views of the plant, and the settlement of Kenhardt is located outside the viewsheds. Approximately 4.5 km of the R383 (approximately 3.5 minutes at 80 km/h) will be within the viewshed but these sections are more than 4 km from the site. Motorists using the gravel road adjacent to the Sishen-Saldanha railway line will potentially be in the viewshed for 2 km (1.5 minutes at 80 km/h) and will be more than 7 km from the site when in the viewshed.

Sensitive visual receptors therefore include:

- Residents and viewpoints on farms surrounding the proposed sites; and
- Motorists using the Transnet road adjacent to the Sishen-Saldanha railway line.

Residents on surrounding farms are highly sensitive to changes in their views since they have an active interest in the landscape. Viewpoints are unlikely to be valued for their scenic views (towards the proposed development) since the landscape has been affected by large structures such as the railway line and substation. Viewpoints on surrounding farms are therefore seen as moderately sensitive.

Traffic on the R383 and Loop 14 (i.e. Transnet road adjacent to the Sishen-Saldanha railway line) are very limited and these roads are unlikely to be used often by tourists. Motorists will consist mostly of residents, Transnet employees and workers on farms along the routes. They will be focusing their attention on the road and are seen as low sensitivity visual receptors.

7.5.2.3 Potential Impacts Identified for the Construction Phase

- Potential visual intrusion of construction activities (discussed in Section 7.2.1) associated with a PV plant on existing views of sensitive visual receptors; and
- Potential visual intrusion of construction activities associated with a 132 kV powerline on existing views of sensitive visual receptors.

7.5.2.4 Potential Impacts Identified for the Operational Phase

- Potential landscape impact of a large solar energy facility on a rural agricultural landscape;
- Potential landscape impact of a 132 kV powerline on a rural agricultural landscape;
- Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors;
- Potential visual intrusion of a 132 kV powerline on the views of sensitive visual receptors; and
- Potential impact of night lighting of a large solar energy facility on the nightscape of the region.

7.5.2.5 Potential Impacts Identified for the Decommissioning Phase

- Potential visual intrusion of decommissioning activities (discussed in Section 7.2.1) associated with a PV plant on views of sensitive visual receptors; and
- Potential visual intrusion of decommissioning activities related to a 132 kV powerline on the existing views of sensitive visual receptors.

7.5.2.6 Potential Cumulative Impacts

- Cumulative impact of solar energy generation projects and large scale electrical infrastructure on the existing rural-agricultural landscape; and
- Cumulative visual impact of solar energy generation projects and large scale electrical infrastructure on existing views of sensitive visual receptors in the surrounding landscape.

7.6 VISUAL IMPACT CONCEPTS AND ASSESSMENT CRITERIA

The assessment of potential impacts for the proposed Boven Solar PV4 project is conducted in the following steps:

- Identification of visual impact criteria (key theoretical concepts);
- Conducting a visibility analysis; and
- Assessment of impacts of the project on the landscape and on receptors (viewers) taking into consideration factors such as viewer sensitivity, visual exposure and visual intrusion.

Potential visual impacts are assessed using a number of criteria which provide the means to measure the intensity or consequence of the impacts. The intensity and other criteria such as spatial extent and duration of the impact are then used to determine its potential significance (Oberholzer, 2005). The visibility of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed area size and is an indication of how much of a region will potentially be visually affected by the development. A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors. Viewer (or visual receptor) sensitivity is a measure of how sensitive potential viewers of the development are to changes in their views. Visual receptors are identified by looking at the viewshed of the proposed development, and include scenic viewpoints, residents, motorists and recreational users of facilities within the viewshed. Their distance from the development (visual exposure) and the composition of their existing views (visual intrusion) will determine impact intensity/consequence.

7.6.1 Visibility Ratings

Visibility is the geographic area from which the proposed project will be visible, or view catchment area (Figure 7-7). The number of visual receptors in the viewshed has an influence on the visibility rating (Oberholzer, 2005).

- *High* - visible from a large area (e.g. several square kilometres).
- *Moderate* – visible from an intermediate area (e.g. several hectares).
- *Low* – visible from a small area around the project site.

The visibility of the proposed project is high in terms of the definition above since the viewshed area is approximately 140 km² (within a 10 km radius of the development site). The viewshed for the proposed 132 kV power line is approximately 140 km² within a 5 km distance from the route. The actual viewsheds are likely to be similar to the calculated viewsheds since existing vegetation in the region is low and will not affect the visibility of the development. However, there are only 10 buildings (within a 10 km radius of the development site) that will be affected (not all of which are residences) which indicate a low number of potentially affected visual receptors. Visibility for the project PV plant is therefore **low**. Similarly, there are only 9 buildings in the power line viewshed which indicates a low visibility for the 132 kV power line.

7.6.2 Visual Exposure

Visual exposure refers to the relative visibility of a project or feature in the landscape and is related to the distance between the observer and the project (Oberholzer 2005). Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view. Visual exposure is classified as follows:

- *High* – dominant or clearly noticeable;
- *Moderate* – recognisable to the viewer; and
- *Low* – not particularly noticeable to the viewer

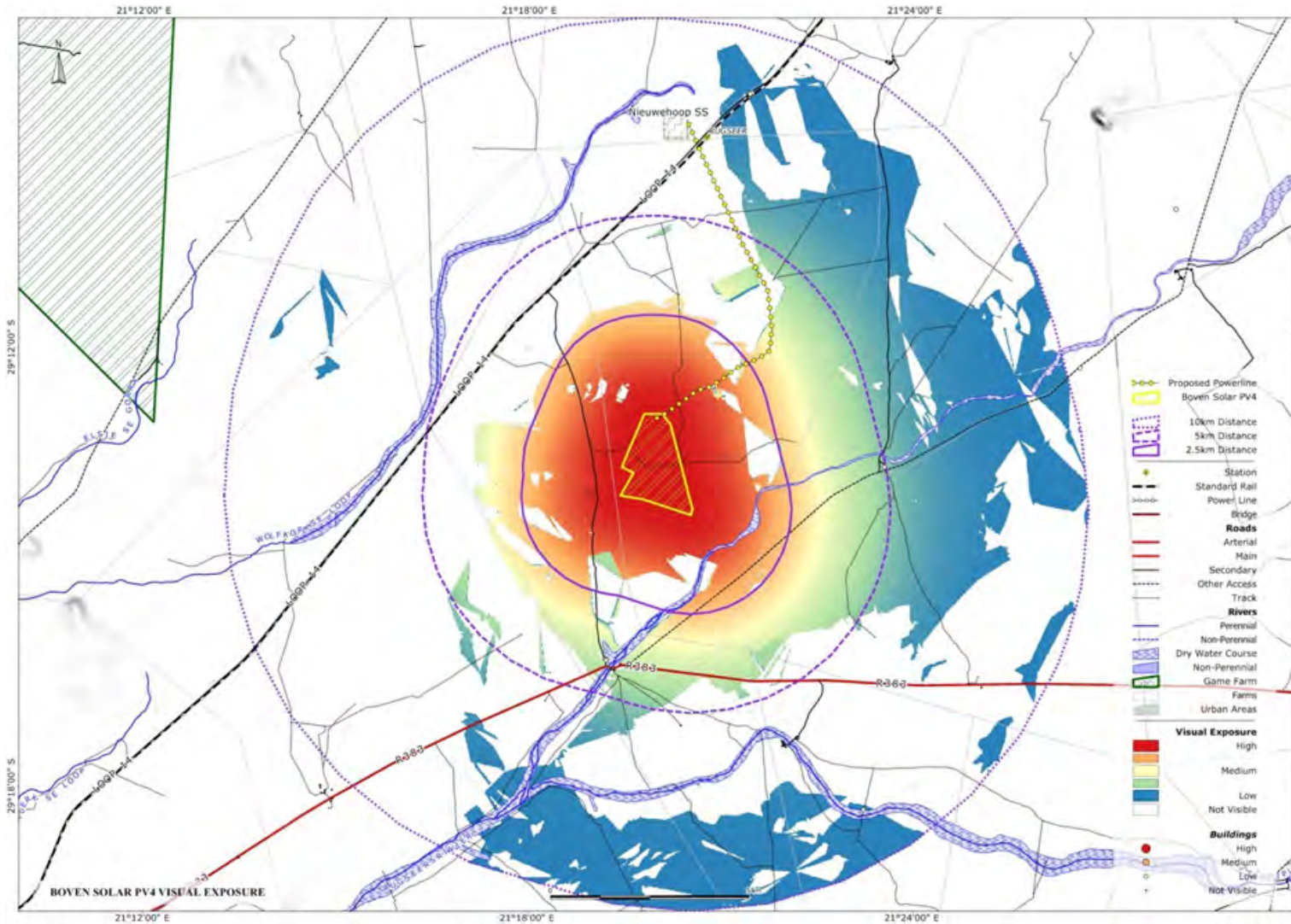


Figure 7-8 Visual exposure for sensitive visual receptors within 10 km of the development.

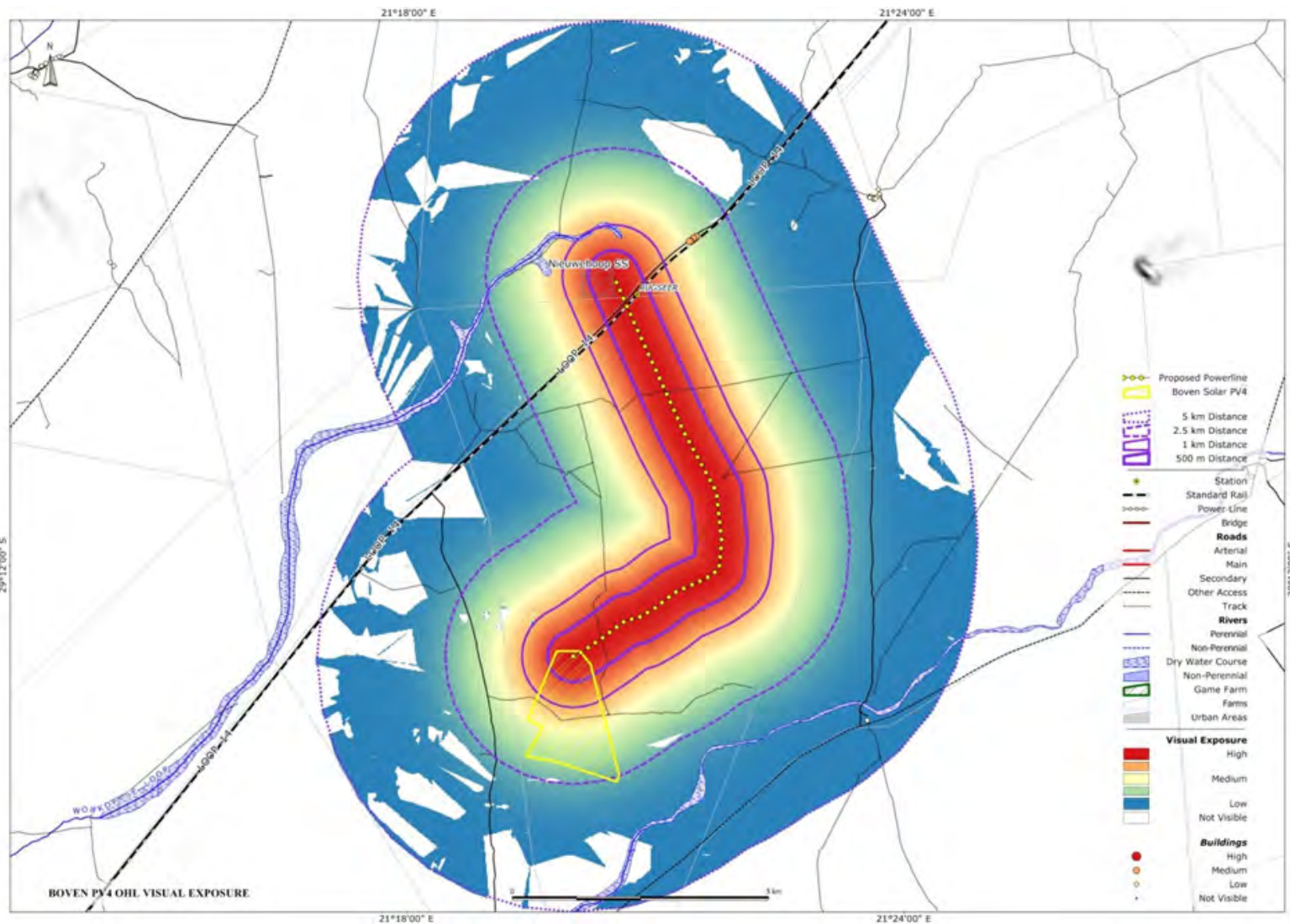


Figure 7-9 Visual exposure for sensitive visual receptors within 5 km of the proposed 132 kV powerline.

7.6.2.1 Residents and Viewpoints on Surrounding Farms

There are no buildings that will be highly exposed to the proposed development and most high visual exposure is limited to parts of the immediately surrounding farms (within 5 km of the development site) (Figure 7-9). There are only 10 buildings in the viewshed and those are more than 2.5 km from the site and will experience low visual exposure. High visual exposure for the 132 kV powerline is limited to approximately 1 km from the proposed route and there are no buildings within this area (Figure 7-10). There are 8 buildings at the Rugseer Siding that will potentially be moderately exposed to the proposed powerline.

7.6.2.2 Motorists

The R383 is for the most part more than 5 km from the development site and motorists using this road will experience low visual exposure to the development when they are in the viewshed. Users of the Transnet road (Loop 14) will also experience low visual exposure to the development where the road is within the viewshed.

7.6.3 Visual Intrusion

Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its *sense of place*. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer, 2005). It can be ranked as follows:

- *High* – results in a noticeable change or is discordant with the surroundings;
- *Moderate* – partially fits into the surroundings, but is clearly noticeable; and
- *Low* – minimal change or blends in well with the surroundings.

7.6.3.1 Photographic Survey

Sites from which landscape photographs were taken are shown in Figure 7-11. Sites with the prefix 'VP' refers to a photographic survey done in June 2014 for a different project in the same region, while 'SCA' refers to the survey done in October 2015 for this project. The discussion below refers to photograph sites on the map.

The landscape surrounding the proposed PV plant site is agricultural with sheep farming the predominant land use. As previously mentioned, it is not pristine wilderness and the natural landscape has been affected by grazing as well as a number of man-made structures not normally associated with agricultural landscapes. The proposed solar energy facility will be located near the Sishen-Saldanha railway line (Figure 7-12). The railway line is an enormous structure and several very long (up to 4 km) ore trains pass through the landscape daily. Rail wagons are 4 m high and locomotives up to 5 m (Figure 7-13). The siding at Rugseer is a relatively large structure and its tower is highly visible in the landscape (Figure 7-14 and Figure 7-15). The Eskom Nieuwehoop Substation is currently under construction. It is also a relatively large structure and is a prominent new element in the landscape (Figure 7-16). Figure 7-17 and Figure 7-18 provide an indication of the landscape closer to the proposed site.

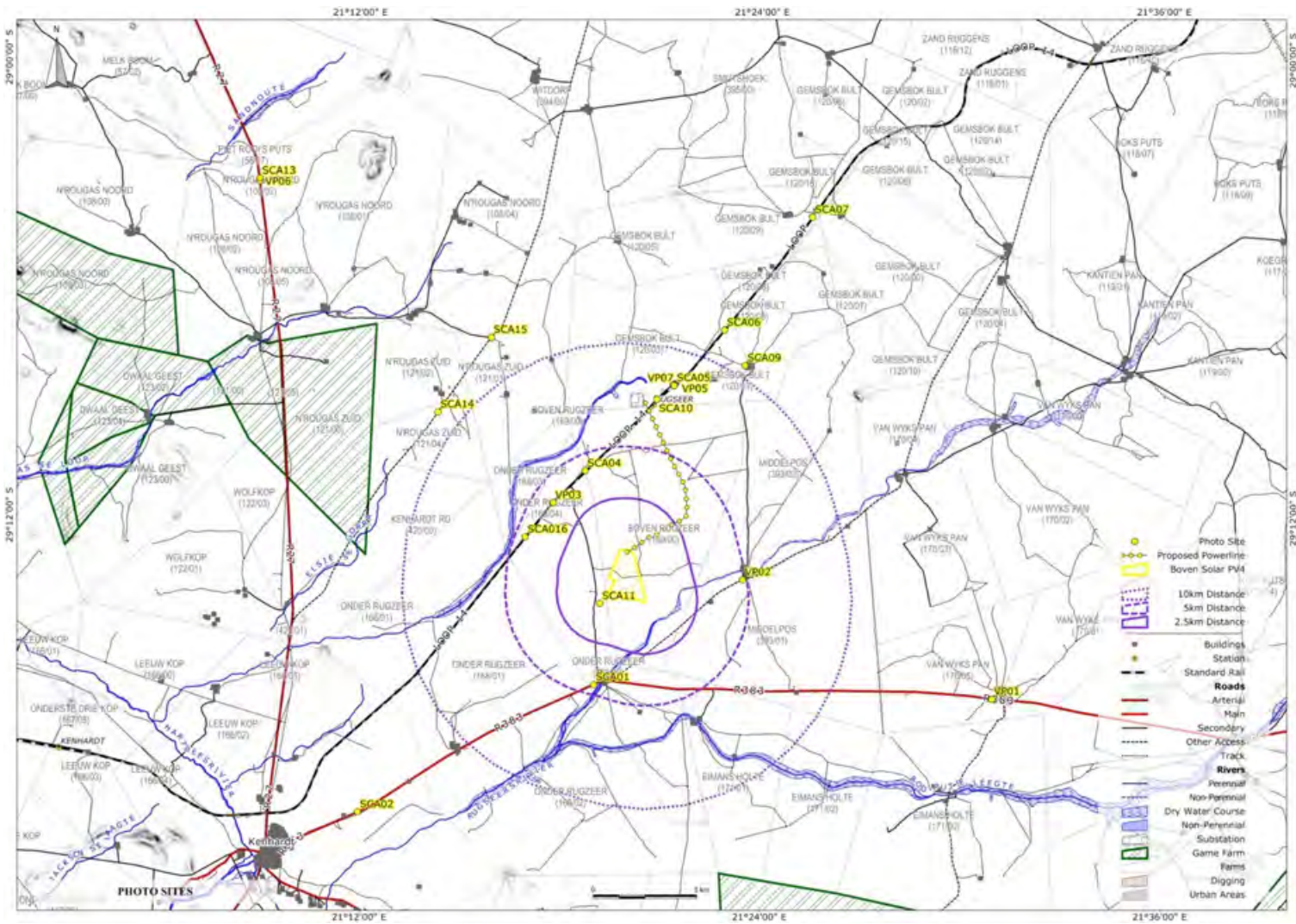


Figure 7-10 Sites visited during photographic survey (SCA - October 2015; VP - June 2014).



Figure 7-11 View south-east from viewpoint SCA10 towards the proposed site. The Saldanha-Sishen railway line is a major element of the existing landscape.



Figure 7-13 Empty ore train on the Saldanha-Sishen railway line.



Figure 7-14 The tower at the Rugszeer Siding as seen from photo site SCA011. The proposed site is in the middle ground between the tower and the viewpoint.



Figure 7-15 View from photo site SCA014 eastwards. The tower at Rugszeer Siding is visible on the left and the new substation more towards the centre.



Figure 7-16 Nieuwehoop Substation currently under construction (Photo site SCA010)



Figure 7-12 Landscape as seen from photo site SCA11. View towards the proposed Boven Solar PV4 site (NE).



Figure 7-13 View west from photo site VP02 towards the proposed Boven Solar PV4 site.

7.6.3.2 Residents and Viewpoints on Surrounding Farms

The proximity of the development to the railway line and the substation means that views towards the development are already impacted. The number of highly sensitive visual receptors that will potentially be affected by the facility is very low. They will experience **moderate** visual intrusion on existing views since even though the solar field will be noticeable (due to its size and technology) it will partially fit into the surrounding landscape (which already includes large and visible structures). The proposed overhead powerline will cause minimal change (low visual intrusion) to existing views since there are already numerous similar structures in the landscape.

7.6.3.3 Motorists

Motorists using the R383 are unlikely to notice the development at the distances they will be from it when within its viewshed. Views from Loop 14 will experience **moderate** visual intrusion due to their proximity to the development and the size of the solar field. The change from agricultural land use to solar field will be noticeable at this distance. The proposed powerline will cause low visual intrusion on existing views of motorists since they will be driving adjacent to the railway line which has similar structures, and there are also other similar structures in the existing landscape.

Table 7-2 Visual Impact Criteria and Impact Intensity for the Boven Solar PV4 project.

Development Alternative	Sensitive Viewer	Criteria	Rating	Reasoning
Boven Solar PV4	Residents and viewpoints on surrounding farms.	Visual Sensitivity	High	Residents are actively interested in their surrounding landscape and spend much of their time there.
		Visual Exposure	Low	There are no buildings in moderate or high visual exposure areas of the viewshed.
		Visual Intrusion	Moderate	Visual intrusion will be moderate for visual receptors on surrounding farms since the landscape is already transformed by existing structures, but the plant will be clearly noticeable.
		Impact Consequence	Substantial	Moderate visual intrusion for highly sensitive visual receptors, but low visual exposure.
	Motorists	Visual Sensitivity	Low	They pass through a landscape and their attention will not be focussed on the landscape.
		Visual Exposure	High	For motorists using the gravel road adjacent to the Sishen-Saldanha railway line (Loop 14).
		Visual Intrusion	Moderate	Motorists will potentially pass within 2 km of the solar field.
		Impact Consequence	Moderate	A few motorists will be highly exposed to the development but will experience low visual intrusion on their existing views.
132 kV Powerline	Residents and viewpoints on surrounding farms.	Visual Sensitivity	High	Residents are actively interested in their surrounding landscape and spend much of their time there.
		Visual Exposure	Moderate	There are no buildings in high visual exposure areas of the viewshed and only the buildings at the Rugseer Siding will potentially be moderately exposed to the powerline.
		Visual Intrusion	Low	There are similar structures in existing views and the proposed power line will cause minimal change to these views.
		Impact Consequence	Moderate	Highly sensitive visual receptors will experience low visual intrusion on their views
	Motorists	Visual Sensitivity	Low	They pass through a landscape and their attention will not be focussed on the landscape.
		Visual Exposure	High	They will pass in close proximity to the power line.
		Visual Intrusion	Low	They drive along the railway line which has similar structures, and there are other power lines and a substation in their existing views.
		Impact Consequence	Slight	Low visual intrusion on low sensitivity visual receptors.

7.7 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

7.7.1 Potential Visual Intrusion of Construction Activities associated with a PV Plant on Existing Views of Sensitive Visual Receptors

7.7.1.1 Significance Statement

The spatial extent of the impact will be **regional** since sensitive visual receptors within 10 km of the proposed development are likely to be affected. The consequence of the impact will be **substantial** since construction will introduce numerous activities and elements that are incongruent with the quiet rural nature of the region. The impact will be of **short to medium term duration** since construction should be possible in 14 months (the Kalkbult 75 MW plant was built in 9 months, however it is understood that the construction period is subject to the final requirements of Eskom and the REIPPPP Request for Proposal provisions at that point in time). The reversibility of the impact is rated as **moderate** since removing the impact will entail further (and similar) activities related to the removal of structures, soil stockpiles and vegetation heaps, and rehabilitation of areas cleared of vegetation. The irreplaceability of the visual resource is **low** since construction activities produce low quality visual resources. The impact status will be **negative** since construction is normally viewed as cluttered and untidy. The probability of the impact occurring is **very likely** since there are sensitive visual receptors that will be affected.

The significance of the impact is **moderate** since the impact is short to medium term and there are very few highly sensitive visual receptors that will be affected, but the consequence is substantial. Mitigation measures could reduce the consequence if it is possible to phase construction activities in such a way as not to disturb the whole solar field area in one phase.

7.7.1.2 Mitigation Measures

Assumptions regarding the management of construction activities are discussed in section 7.1.4.1. Mitigation measures in addition to the best practice guidelines are:

- Preparation of the solar field area (i.e. clearance of vegetation, grading, contouring and compacting) and solar field construction should be phased in a way that makes practical sense in order to minimise the area of soil exposed and duration of exposure;
- Parking areas should be demarcated and strictly controlled so that vehicles are limited to specific areas only;
- Night time construction should be avoided where possible; and
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.

The significance of the impact after mitigation will be **low** if mitigation measures are successfully implemented to lower the impact intensity/consequence.

7.7.2 Potential visual intrusion of construction activities associated with a 132 kV powerline on existing views of sensitive visual receptors

The spatial extent of the potential impact will be **local** since sensitive visual receptors further than 2 km from the proposed transmission line route will at most experience low visual exposure. The consequence of the potential impact will be **moderate** since construction will introduce activities and elements that are incongruent with the quiet rural nature of the region. The impact will be of **very short-term** duration since the proposed transmission line is only approximately 10 km long. The construction and decommissioning phases of the project are transitional and visual impacts are temporary – reversibility of impacts and irreplaceability of visual resources are therefore not applicable. The impact status will be

negative since construction is normally viewed as cluttered and untidy. The probability of the impact occurring is **likely** since there are very few sensitive visual receptors that will be affected.

The significance of the potential impact without the implementation of mitigation measures is rated as **low** since the impact is predicted to be very short term in nature and there are very few highly sensitive visual receptors that will be affected.

7.7.2.1 Mitigation Measures

Assumptions regarding the management of construction activities are discussed in Section 7.1.4.1 of this report. Mitigation measures in addition to the best practice guidelines are:

- Night time construction should be avoided where possible; and
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.

The significance of the impact after mitigation will remain **low** with the implementation of mitigation measures.

7.7.3 Potential Landscape Impact of a Large Solar Energy Facility on a Rural Agricultural Landscape

7.7.3.1 Significance Statement

The spatial extent of the impact will be **regional** since it will affect the surrounding landscape. The consequence of the impact will be **slight** since the landscape character is impacted by the Sishen-Saldanha railway line and is not a typical rural agricultural landscape of the region. The impact duration will be **long term** and will cease only once the proposed PV plant has been removed from the landscape. The reversibility of the potential impact is rated as **high** – the rural agricultural character will return unless rehabilitation is completely unsuccessful. The irreplaceability of the landscape character type is rated as **low** because it is a compromised landscape and other areas where the rural agricultural landscape is less altered exist in the region. The impact status will be **negative** since the rural sense of place of the region will change. The probability of the impact occurring is **very likely** since the change will be obvious and extensive (i.e. vegetation will be replaced with technologically complex structures).

The significance of the impact before mitigation is **very low** since the impact is long term and regional in nature but the consequence of the impact is slight.

7.7.4 Potential landscape impact of a 132 kV powerline on a rural agricultural landscape

7.7.4.1 Significance Statement

The spatial extent of the potential impact will be **local** since it is unlikely to affect the landscape beyond 2 km from the proposed transmission line route. The consequence of the potential impact will be **slight** since the landscape character is impacted by the Sishen-Saldanha railway line and existing large scale electrical infrastructure in the form of the Eskom Nieuwehoop Substation. The impact will be **long term** and will cease only once the power line has been removed. The potential impact will diminish over time as other power lines to the substation are built and the electrical infrastructure becomes a more dominant element of the landscape. The reversibility of the impact is **high**. The irreplaceability of the landscape character type is **low** because it is a compromised landscape and other areas where the rural agricultural landscape is less altered exist in the region. The impact status will be **negative** since the rural sense of place of the region will change. The probability of the impact occurring is **likely** depending on how far development of the power lines planned for the Eskom Nieuwehoop Substation has progressed by the time the proposed 132 kV line is built.

The significance of the potential impact before mitigation is rated as **very low** since the impact is localized and has a low intensity (i.e. slight consequence). No mitigation measures are recommended.

7.7.5 Potential Visual Intrusion of the Proposed Solar Energy Facility on the Views of Sensitive Visual Receptors

7.7.5.1 Significance Statement

The spatial extent of the impact will be **regional** since sensitive visual receptors within 10 km of the development are likely to be affected. The consequence of the impact will be **substantial** since very few highly sensitive visual receptors will potentially be affected (moderate visual intrusion). The impact will be of **long term duration** since it will only end once the project ends and the cleared area has been rehabilitated. The reversibility of the potential impact is rated as **high** since removal of the solar panels, structures and buildings, and subsequent recovery of vegetation will remove most of the impact. It is unlikely that this area can be completely rehabilitated to its pre-construction state and due to the arid climate of the region; vegetation will take many years to recover. The visual resources of the region are already impacted by stock farming activities, the ore railway line passing through it and the Nieuwehoop Substation. The irreplaceability of the visual resources is therefore seen as **low**. The impact status will be **negative** since highly technological structures will replace natural and familiar landscape over a relatively large area. The probability of the impact occurring is **likely** since there are very few highly sensitive visual receptors that will be affected.

The significance of the impact before mitigation is **medium** since very few highly sensitive visual receptors are likely to be affected by the development. Mitigation measures are aimed at reducing the consequence of the impact by reducing the incongruence of the structures with the surrounding landscape.

7.7.5.2 Mitigation Measures

Solar Arrays

- The project developer should maintain rehabilitated surfaces until a self-sustaining stand of vegetation is established and visually adapted to the undisturbed surrounding vegetation. No new disturbance should be created during operations without approval by the Environmental Officer;
- Restoration of disturbed land should commence as soon after disturbance as possible;
- Dust and noxious weed control should be part of maintenance activities;
- Road maintenance activities should avoid damaging or disturbing vegetation; and
- Painted features should be maintained and repainted when colour fades or paint flakes.

Buildings

- Appropriate coloured materials should be used for structures to blend in with the backdrop of the project where this is technically feasible and the colour or paint will not have a deleterious effect on the functionality of the structures;
- Appropriate colours for smooth surfaces often need to be two to three shades darker than the background colour to compensate for shadows that darken most textured natural surfaces;
- Materials, coatings and paints should be chosen based on minimal reflectivity where possible; and
- Grouped structures should be painted the same colour to reduce visual complexity and contrast.

The significance of the impact after mitigation is **low** since mitigation measures will reduce the consequence from substantial to moderate.

7.7.6 Potential visual intrusion of a 132 kV powerline on the views of sensitive visual receptors

7.7.6.1 Significance Statement

The spatial extent of the potential impact will be **local** since only sensitive visual receptors within 2 km of the proposed development are likely to be affected and there are very few within this distance of the proposed transmission line route. The consequence of the impact will be rated as **slight** since very few highly sensitive visual receptors will potentially be affected and visual intrusion is expected to be low. The potential impact is rated with **long term** duration since it will only end once the project ends. The reversibility of the potential impact is rated as **high** since it is unlikely that vegetation will have to be removed for the servitude (considering the sparse vegetative cover within the general area). The visual resources of the region are already impacted by stock farming activities, the ore railway line passing through it and the Eskom Nieuwehoop Substation. The irreplaceability of the visual resources is therefore seen as **low**. The impact status will be **negative** since power lines detract from the scenic potential of views. The probability of the impact occurring is **likely** since there are motorists that will pass within 1 km of the proposed transmission line route.

The significance of the impact (without the implementation of mitigation measures) is rated as **very low** since very few sensitive visual receptors are likely to be affected by the proposed development.

7.7.6.2 Mitigation Measures

It is recommended that, where possible, the type of power line towers used for the proposed power line should be similar to existing power line towers in the landscape.

The significance of the impact after mitigation will remain **very low** with the implementation of mitigation measures.

7.7.7 Potential Impact of Night Lighting of a Large Solar Energy Facility on the Nightscape of the Region

7.7.7.1 Significance Statement

At the time of the photographic survey and site visit (October 2015) the lights at the new Nieuwehoop Substation were not yet operational and the nightscape was very dark, containing only a few lights – at the Rugszeer siding as well as railway signal lights. Signal lights are bright and particularly noticeable when they flash. Once the substation lights are operational they will change the nightscape of the region significantly since substations are normally brightly lit. The lighting of the proposed PV plant will mostly be localised and not spread out over the solar field. The lights will not be dissimilar to security lights at farmsteads.

The spatial extent of the impact will be **local** since the lights should resemble lights at a farmstead. The consequence of the potential impact will be **slight** since very few sensitive receptors will be affected and the substation lights (once operational) will be far more prominent - the proposed solar facility lights will contribute little to light pollution. The impact will be of **long term** duration since it will only end once the project ends. The reversibility of the potential impact is rated as **high** since removal of the plant will remove all lights as well. The irreplaceability of the visual resources is seen as **low** since there are already similar lights in the nightscape and not many will be added. The impact status will be **negative** since the lights will reduce the dark nightscape further. The probability of the impact occurring is **likely** since there are sensitive visual receptors that will be affected.

The significance of the impact before mitigation is **very low** since very few sensitive visual receptors are likely to be affected by the development. Mitigation measures will contain the impact and minimise contribution to light pollution in a region known for its dark nightscapes.

7.7.7.2 *Mitigation Measures*

- A lighting plan that documents the design, layout and technology used for lighting purposes should be prepared, indicating how nightscape impacts will be minimised;
- The lighting plan should include a process for promptly addressing and mitigating complaints about potential lighting impacts;
- Lighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security;
- Uplighting and glare (bright light) should be minimised using appropriate screening;
- Low-pressure sodium light sources should be used to reduce light pollution;
- Light fixtures should not spill light beyond the project boundary;
- Timer switches or motion detectors (within safety requirements) should be used to control lighting in areas that are not occupied continuously; and
- Lights should be switched off when not in use whenever it is in line with safety and security.

The significance of the impact after mitigation will remain **very low**.

7.7.8 **Potential Visual Intrusion of Decommissioning Activities associated with a PV Plant on Views of Sensitive Visual Receptors**

7.7.8.1 *Significance Statement*

The spatial extent of the impact will be **regional** since sensitive visual receptors within 10 km of the development are likely to be affected. The consequence of the impact will be **substantial** since activities similar to those during the construction phase will intrude on the quiet rural nature of the region. The impact duration should be shorter than for the construction phase (i.e. **short-term**). The impact is that of visual intrusion of activities associated with the decommissioning of the PV plant and includes equipment, workers, laydown areas and exposure of soil after removal of structures. It also includes activities related to rehabilitation of cleared areas. High reversibility of this impact implies the halting of decommissioning activities, the removal of workers and equipment and the rebuilding of structures related to the PV plant, which means that construction activities will occur which causes a very similar impact to that of decommissioning activities. The convoluted nature of this argument indicates that reversibility probably does not have a clear meaning in this case. The reversibility is therefore rated as **low** since it seems that reversing the impact will not remove it. Irreplaceability of the visual resource is **low** since decommissioning activities do not result in visual resources of high quality. The impact status will be **negative** since this phase will be perceived as cluttered and untidy. The probability of the impact occurring is rated as **very likely** since there are sensitive visual receptors that will be affected.

The significance of the impact before mitigation is **moderate** since the impact is temporary and there are very few highly sensitive visual receptors that will be affected, but its consequence is substantial.

7.7.8.2 *Mitigation Measures*

- Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes;
- Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of indigenous species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape;
- Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape;
- Working at night should be avoided where possible; and
- Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.

If decommissioning of the solar field and rehabilitation of the cleared area is phased in such a way that the exposed soil area is minimized then the consequence of the impact will be lowered to moderate and the significance of the impact will then be **low**.

7.7.9 Potential visual intrusion of decommissioning activities related to a 132 kV powerline on the existing views of sensitive visual receptors

7.7.9.1 Significance Statement

The spatial extent of the potential impact will be **local** since sensitive visual receptors further than 2 km from the proposed transmission line route will at most experience low visual exposure. The consequence of the impact will be **moderate** since activities similar to those during the construction phase will intrude on views of sensitive visual receptors. The impact duration should be shorter than for the construction phase – **temporary or very short-term**. The construction and decommissioning phases of the project is transitional and visual impacts are temporary – reversibility of impacts and irreplaceability of visual resources are therefore not meaningful. The impact status will be **negative** since this phase will be perceived as cluttered and untidy. The probability of the impact occurring is **likely** since there are very few sensitive visual receptors that will be affected.

The significance of the impact without the implementation of mitigation measures is rated as **low** since the impact is temporary and there are very few highly sensitive visual receptors that will be affected.

7.7.9.2 Mitigation Measures

The following mitigation measures have been recommended:

- Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes;
- Stockpiled topsoil should be reapplied to disturbed areas and these areas should be re-vegetated using a mix of indigenous species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape;
- Edges of re-vegetated areas should be feathered to reduce form and line contrasts with surrounding undisturbed landscape;
- Working at night should be avoided, where possible; and
- Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.

The significance of the impact after mitigation will remain **low** with the implementation of mitigation measures.

7.7.10 Cumulative Impact of Solar Energy Generation Projects and Large Scale Electrical Infrastructure on the Existing Rural-Agricultural Landscape

7.7.10.1 Significance Statement

The introduction of a large railway line, siding and tower has changed the landscape character of the region by reducing its sense of remoteness. This is further changing with the addition of a large substation and a network of high-voltage power lines which are highly visible structures due to their height and linear extent. The substation and power lines are being constructed and therefore represent a definite change in landscape character. Several large solar energy facilities (Figure 7-19) are being proposed for the region immediately surrounding the proposed Boven Solar PV4 project area (within 20 km of the site – see section 7.1.4.1, as well as Chapter 4 of the Scoping Report). In the event that some of them are built, large areas of natural vegetation and stock farming land will be transformed into fields covered in thousands of solar panels. Solar fields will become a common feature of the landscape and the rural-agricultural landscape character will have a significant power generation component (as well as

large scale electrical infrastructure). The cumulative change in landscape character from rural agricultural/electrical infrastructure to include a large power generation component will have only a **slight consequence** since the original character is not one of high quality and there are other landscapes in the surrounding region with higher quality. These do not include electrical infrastructure of this magnitude and are more representative of rural agriculture in an arid landscape.

The spatial extent of the cumulative impact is **regional** (within 20 km of the proposed Boven Solar PV4 development). The duration of the impact is rated as **long term** since the cumulative impact will last for as long as the solar fields are in the landscape. The **status** of the impact is neutral since the overall change in landscape character will not affect a highly sensitive, scarce or highly valued landscape character and the probability of it occurring is **likely** since there are a number of large projects proposed for the area.

The significance of this cumulative impact on the landscape is rated as **very low** without the implementation of mitigation measures. Mitigation measures are not recommended in this regard.

7.7.11 Cumulative Visual Impact of Solar Energy Generation Projects and Large Scale Electrical Infrastructure on Existing Views of Sensitive Visual Receptors in the Surrounding Landscape

7.7.11.1 Significance Statement

The original visual resources of the region under assessment were represented by open, long distance views of arid landscape with low hills and sparse vegetation cover. There were limited opportunities for scenic vistas but the sense of place was remote wilderness. Subsequent stock farming practices have reduced the visual resources by impacting on the vegetation and wilderness. The railway line and associated infrastructure (including the new substation and electrical infrastructure), have further altered the sense of place of the region and reduced the opportunities for scenic views. The addition of several large fields of solar arrays (Figure 7-19) and associated electrical infrastructure will affect the existing visual resources but since these are not of high quality, very few sensitive visual receptors will be affected, and opportunities for scenic views are very limited, the consequence of the cumulative visual impact is rated as **moderate**.

It should be noted that the projects currently proposed for the region are all in close proximity to the railway line and new substation (structures with high visibility and visual intrusion). Furthermore, very few highly sensitive visual receptors are likely to be affected even if all of them are eventually built, and at this point Kenhardt lies outside any of the viewsheds. Game farms are mostly outside of the viewsheds (or are further than 10 km from any of the projects indicating at most low visual exposure for areas in any viewsheds). The R27 is more than 10 km from any of the projects and only short sections of this road provide any potential views of solar plants for tourists using this road.

The spatial extent of the cumulative impact is **regional** (within 20 km of the proposed Boven Solar PV4 development). The duration of the impact is rated as **long term** since the cumulative impact will last for as long as the solar field is in the landscape. The **status** of the impact is negative since the visual resources of the region are reduced, and the probability of it occurring is **likely** since there are highly sensitive visual receptors that will be affected.

The significance of the cumulative impact is rated as **low** without the implementation of mitigation measures. Mitigation measures are not recommended in this regard.

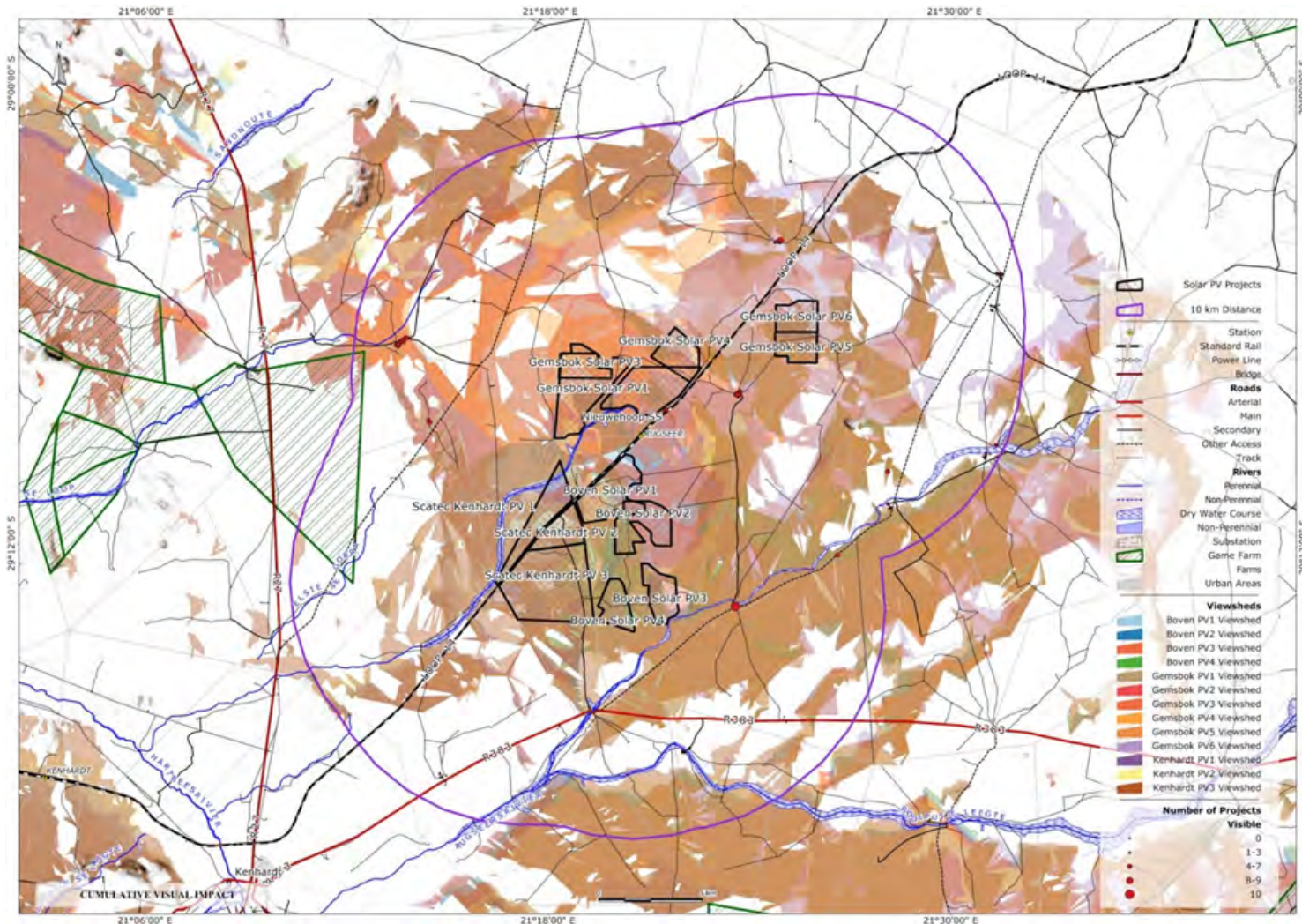


Figure 7-14 Map showing viewsheds for proposed solar energy projects in the region (where data was available). The map also provides an indication of the number of projects that may be visible from buildings within 10 km of a project (views may be of only small parts of a project).

7.8 IMPACT

ASSESSMENT SUMMARY

Table 7-3 Impact assessment summary table for the Construction Phase

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Construction activities associated with a PV Plant	Loss of visual resources	Negative	Regional	Short Term	Substantial	Very Likely	Moderate	Low	Phased clearing of the area for solar field in order to reduce the amount and duration of bare soil exposure.	Moderate	Low	4	High
Construction activities associated with a 132 kV powerline	Loss of visual resources	Negative	Local	Very Short Term	Moderate	Likely	High	Low	In line with best practice construction guidelines.	Low	Low	5	High

Table 7-4 Impact assessment summary table for the Operational Phase

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Landscape impact caused by large PV Plant	Change of landscape character	Negative	Regional	Long Term	Slight	Very Likely	High	Low	None	Very Low	Very Low	5	High
Landscape impact caused by large 132 kV powerline	Change of landscape character	Negative	Local	Long Term	Slight	Likely	High	Low	None	Very Low	Very Low	5	High
Visual intrusion of a solar energy facility on views of sensitive visual receptors	Change in existing views of sensitive visual receptors.	Negative	Regional	Long Term	Substantial	Likely	High	Low	Building facades and colours such that they blend in with the landscape background where technically feasible.	Moderate	Low	4	High

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Visual intrusion of a 132 kV powerline on views of sensitive visual receptors	Change in existing views of sensitive visual receptors	Negative	Local	Long Term	Slight	Likely	High	Low	Powerline towers to be similar to those in the landscape already where possible.	Very Low	Very Low	5	High
Impact of night lighting on the nightscape of the region	Light pollution in a dark nightscape.	Negative	Local	Long Term	Slight	Likely	High	Low	Lighting plan should be prepared which will minimise impacts on the nightscape	Very Low	Very Low	5	High

Table 7-5 Impact assessment summary table for the Decommissioning Phase

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Visual impact of decommissioning activities associated with a PV Plant on existing views of sensitive visual receptors	Impact on visual resources.	Negative	Regional	Short Term	Substantial	Very Likely	Low	Low	Rehabilitation of areas cleared for solar field	Moderate	Low	4	High
Visual impact of decommissioning activities associated with a 132 kV powerline on existing views of sensitive visual receptors	Impact on visual resources	Negative	Local	Temporary to very short term	Moderate	Likely	High	Low	Disturbed and transformed areas should be rehabilitated. Other best practice guidelines for construction activities apply.	Low	Low	4	High

Table 7-6 Cumulative impact assessment summary table

Cumulative Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Cumulative impact on the landscape of the region.	Change in landscape character	Neutral	Regional	Long term	Slight	Likely	High	Low	None	Very Low	Very Low	5	High
Cumulative impact on sensitive visual receptors.	Visual intrusion	Negative	Regional	Long Term	Moderate	Likely	High	Low	None	Low	Low		High

7.9 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

7.9.1 Planning and Design

There are some mitigation measures that require input during the design and planning phase of the project in order to reduce visual intrusion of construction activities. These include plans to minimize fire hazards and dust generation, and rehabilitation plans for areas temporarily cleared for construction purposes. A lighting plan is required to minimize light pollution, light trespass and glare during construction, operational and decommissioning phases.

Design of buildings and structures should include appropriate colours to blend into the background landscape and materials, coatings and paints should be chosen based on minimal reflectivity. Grouped structures should be painted the same colours to reduce visual complexity and contrast. These measures exclude structures and buildings for which the choice of paint and colour may have a deleterious effect on the functionality of the building or structure (in other words, those structures for which the paint and colour are pre-determined for optimal functionality are excluded).

7.9.2 Construction Phase

Adherence to the erosion, dust, fire and light plans is necessary to minimise visual intrusion of construction activities and should be monitored regularly by the construction manager. Construction boundaries should be clearly demarcated and monitored, and good housekeeping on site should be maintained. Rehabilitation of temporary cleared areas should commence as soon as possible and the rehabilitation process should be regularly monitored by the Environmental Officer.

7.9.3 Operational Phase

A maintenance plan for buildings and structures should be followed to ensure that structures remain as non-reflective as possible, and buildings remain as unobtrusive as possible. Maintenance of access roads should not cause further disturbance and damage to the surrounding landscape.

7.9.4 Decommissioning Phase

The decommissioning phase of the project will potentially cause similar visual impacts as that during the construction phase and as such similar mitigation measures apply. The successful completion of this phase should leave the project site in a similar condition, visually, as before construction commenced. This can be accomplished by appropriate landscaping and revegetation of disturbed areas.

7.10 CONCLUSION AND RECOMMENDATIONS

The landscape surrounding the proposed site has a rural agricultural character which has been transformed by extensive stock farming and large scale infrastructure in the form of the Sishen-Saldanha ore railway line and the Eskom Nieuwehoop Substation.

The following sensitive visual receptors will potentially be affected by the introduction of a large PV plant into the landscape:

- Residents and viewpoints on farms surrounding the proposed development site. These are highly sensitive visual receptors since they have an active interest in their surrounding landscape; and
- Motorists using the R383 and the Transnet Service Road (Loop 14) adjacent to the ore railway line. Motorists are classified as low sensitivity visual receptors since they pass through the landscape and their attention is mostly focused on the road.

Visual intrusion on the existing views of highly sensitive visual receptors will be moderate since the development will be noticed but the quality of views is already compromised by large existing structures. The significance of the impact is moderate before mitigation and low if mitigation is successful. Mitigation measures should lower the consequence of the impact from substantial to moderate and the significance of the impact to low.

The impact of night lighting of the facility on the nightscape (during the operational phase) is likely to be negligible compared to that of the nearby substation if a lighting plan is prepared which minimises light spill onto adjacent properties and avoids glaring lights which may affect visual receptors in the surrounding landscape.

The significance of cumulative impacts on the surrounding landscape character is low since the landscape is rapidly changing due to the introduction of large scale and highly visible rail and electrical infrastructure.

The significance of the cumulative visual impact on sensitive visual receptors is similarly low due to the existing and new structures which have severely limited potential scenic views in the region.

The area proposed for this project falls within a renewable development zone (REDZ7 – Upington Solar) as identified in the national SEA for renewable energy developments and is therefore seen on a regional scale as an appropriate area for solar energy developments. On a local scale the visually disturbed landscape surrounding the Nieuwehoop Substation and the low number of highly sensitive visual receptors that will potentially be affected, makes this an ideal area to locate the proposed Boven Solar PV4 solar energy facility. It is the opinion of the visual specialist that this project should therefore be authorised with adherence to mitigation measures as set out in this report.

It is not clear what an acceptable limit should be for the cumulative visual impact of solar energy projects in the region but visual specialists assessing future projects could look at the following aspects of the region to aid in decision making:

- Distance from the railway line since this is a major structure in the landscape which affects views as well as landscape quality;
- Distance from the Nieuwehoop Substation which similarly affects views and landscape quality;
- At the time of this assessment there were no high voltage transmission lines in the surrounding landscape, but at least one was already under construction just outside Kenhardt. Another set of transmission lines are planned from Upington. These lines will meet at the Nieuwehoop Substation and will affect the surrounding landscape and view qualities considerably.
- Kenhardt is currently outside all of the solar energy project viewsheds. Residents are not necessarily highly sensitive visual receptors, but the number of visual receptors that may be affected by a project will increase considerably if Kenhardt falls within a viewshed.
- There are game farms west of the currently proposed projects and south of the R383 but these are either outside any of the viewsheds or are more than 10 km from proposed projects (i.e. low visual exposure).
- The R27 is more than 10 km from any of the proposed projects and is mostly outside all viewsheds. The road is used by tourists travelling from Cape Town to visit tourist attractions along the Orange River and further north.

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Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (BOVEN SOLAR PV4) on the Remaining Extent of Boven Rugzeer Farm 169, north-east of Kenhardt, Northern Cape Province

EIA REPORT



CHAPTER 8:

Ecology (Vegetation and Freshwater) Impact Assessment

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LIST OF ABBREVIATIONS

AIS	Alien and Invasive Species
DAFF	Department of Agriculture Forestry and Fisheries
DDD	Data Deficient – Insufficient Information
DDT	Data Deficient – Taxonomically Problematic
DEA	Department of Environmental Affairs
DENC	Department of Environment and Nature Conservation: Northern Cape
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPR	Environmental Management Programme
EWRM	Ecological Water Resource Monitoring
LC	Least Concern
MAP	Mean Annual Precipitation
NCNCA	Northern Cape Nature Conservation Act
NFA	National Forest Act (Act 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas (NFEPA)
NWA	National Water Act
PES	Present Ecological State
SIBIS	SANBI's biodiversity information system (SIBIS) data base
RQIS	Resource Quality Information Services (RQIS) database from DWA
VU	Vulnerable
WUL	Water Use License
WULA	Water Use License Application

GLOSSARY

<i>Definitions</i>	
<i>Apedal</i>	Soil with no visible internal structure.
<i>Aquifer</i>	A geological formation that has structures or textures that hold water or permit appreciable water movement through them.
<i>Catchment</i>	In relation to a watercourse or watercourses or part of a watercourse, means the area from which all rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points (National Water Act No 36 of 1998)
<i>Instream habitat</i>	Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse (National Water Act No 36 of 1998) .
<i>Riparian habitat</i>	Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
<i>Swale</i>	A low-lying or depressed area, usually a wet area.
<i>Watercourse</i>	Means- ((l) a river or spring: (h) a natural channel in which water flows regularly or intermittently:(f) a wetland, lake or dam into which, or from which, water flows: and (d) any collection of water which the Minister may, by notice in the Government Gazette, declare to be a watercourse, and a reference to a watercourse includes where relevant, its bed and banks (National Water Act No 36 of 1998)
<i>Water resource</i>	Includes a watercourse, surface water, estuary or aquifer.
<i>Wetland</i>	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances support or would support vegetation typically adapted to life in saturated soil.

EXECUTIVE SUMMARY

Kyllinga Consulting has been appointed as a sub-consultant of Pachnoda Consulting, to conduct a vegetation and watercourse assessment, as part of the ecological assessment for the proposed development of a solar photovoltaic (PV) facility (Boven Solar PV4) on the remaining extent of Boven Rugzeer Farm 169, north-east of Kenhardt in the Northern Cape. This included the delineation of all the vegetation and watercourses on site, as well as determining the sensitivity of these units. The project forms part of the Phase 2 Nieuwehoop Solar PV Development which consists of a total of seven proposed solar PV facilities.

The project consists of a solar PV farm and associated infrastructure (including a 132 kV transmission line connecting the site to the substation approximately 9 km to the north). Several impacts may result from the proposed project activities.

Solar PV plant:

- The proposed solar PV plant consists of numerous solar panels covering most of the site. The solar panels are mounted to maximize the amount of sunlight intercepted. This will result in maximum shading of the surroundings.
- The solar panels are impervious to rain and the water will run off the panels.
- Water will be collected in swales where necessary.
- The solar panels are mounted on poles that must be firmly embedded in the soil to prevent collapse. Soil disturbance will therefore take place at each solar panel.
- Access routes will be constructed to the Boven PV 3 site and for access to the panels.

Powerlines:

- The project includes the construction of a 132 kV powerline from the solar PV facility to the substation located on. Since powerlines are raised the impacts are mainly associated with the:
 - Pylons,
 - Access road,
 - Vegetation clearing under the powerlines.
- Impacts are mostly associated with vegetation clearing, soil erosion and soil compaction.
- Due to the low cover of the vegetation, no mowing is expected to be necessary on site.

The vegetation units described in this section include all the vegetation types recorded for the entire study unit, including the seven sites proposed for PV facilities on the farms Gemsbok and Boven Rugzeer for the proposed Boven PV2 PV3, PV4 as well as the Gemsbok PV3-, PV4, PV5 and PV6 sites. The species present throughout the different vegetation units are mostly similar, but the dominant species varies, the vegetation units are therefore characterised by the dominant species in each vegetation unit. The vegetation units on site cannot be classified into clearly defined vegetation units, but occur along an environmental gradient. The gradients are mostly along substrate and moisture axes. It is however possible to identify three main vegetation units on site, as well as several sub-units. The vegetation types identified on the greater study site are listed in Table 8.1 and the potential impacts on site are summarised in Table 8.2.

Table 8.1: Summary of vegetation units and their sensitivity in the project area.

Vegetation Unit	Sub-unit	Sensitivity	On site / in area
Short shrubveld (Unit 1)	<i>Salsola aphylla</i> – <i>Stipagrostis uniplumis</i> short shrubveld (Unit 1.1)	Moderate	On site
	<i>Zygophyllum microphyllum</i> – <i>Pteronia mucronata</i> short shrubveld on calcrete (Unit 1.2)	Moderate	In area
Rock outcrops (Unit 2)	<i>Aloe dichotoma</i> – <i>Tetraena retrofracta</i> rock outcrop (Unit 2.1)	High	In area
	<i>Tetraena retrofracta</i> quartz outcrop (Unit 2.2)	Moderate to High	On site
	<i>Salsola aphylla</i> – <i>Stipagrostis obtusa</i> rocky areas (Unit 2.3)	Moderate to High	In area
Watercourses (Unit 3)	<i>Prosopis glandulosa</i> watercourse (Unit 3.1)	Moderate to High	In area
	<i>Rhigozum trichotomum</i> watercourse (Unit 3.2)	High	On site
	<i>Roepera morgsana</i> floodplain (Unit 3.3)	Moderate to High	On site / in area

Table 8.2: Summary of Impacts

Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Construction Phase		Operational Phase		Decommissioning Phase		Cumulative impact		Potential Mitigation Measures
			Significance of Impact and Risk		Significance of Impact and Risk		Significance of Impact and Risk		Significance of Impact and Risk		
			Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)	Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)	Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)	Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)	
Clearing of vegetation	Loss of species of conservation importance	Negative	High	Moderate	Moderate	Low	Low	Low	High	Moderate	Avoidance, Search and Rescue
Clearing of vegetation	Loss of primary vegetation	Negative	Moderate	Low	Low	Low	Low	Low	High	High	Avoidance of high sensitivity areas
Clearing of vegetation	Soil compaction and vehicle wheel track entrenchment	Negative	Low	Very Low	Low	Very Low	Low	Very Low	N/A	N/A	Monitoring and rehabilitation plan
Clearing of vegetation, vehicle movement	Erosion and sedimentation	Negative	Low	Very Low	Low	Very Low	Low	Very Low	Moderate	Low	Monitoring and rehabilitation plan
Clearing of vegetation	Establishment of alien and invasive species	Negative	Low	Low	Low	Low	Low	Low	Low	Low	Invasive species monitoring and control plan
Movement of vehicles and construction activities	Pollution and littering	Negative	Low	Very Low	Very Low	Very Low	Very Low	Very Low	N/A	N/A	EMP

Development on site can be supported provided that:

- All mitigation measures included in this report are adhered to.
- No development may take place within the High; or Moderate to High conservation importance area.
- No development may take place within the watercourse buffers.
- All individuals of *Aloe dichotoma* and *Hoodia gordonii* impacted on site must be relocated to sufficient habitat in the area.
- All relevant permits pertaining to the species of conservation importance on site must be obtained before construction commences.
- A WUL is received from the DWS where relevant.

Table 8.3: Summary of site sensitivity and comments.

Site	Alternative	Sensitivity	Total size (ha)	Size (ha)	Size (%)	Recommendations
Boven Solar PV4	Proposed	High	285.99	38.81	13.57	More than 80% of the site falls within a moderate sensitivity area. Development on this site is therefore supported, but the high sensitivity areas must be avoided. This is the preferred alternative.
		Moderate to High		14.30	5.00	
		Moderate		232.88	81.43	
Boven Solar PV3 & PV4	Transmission	High	1 083.94	135.32	12.48	Most of the transmission line falls within a Moderate sensitivity area. Mitigation measures must be adhered to and high sensitivity areas avoided.
		Moderate to High		288.52	26.62	
		Moderate		660.11	60.90	

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R982	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain-	Appendix A of the EIA Report
a) details of-	
i. the specialist who prepared the report; and	
ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix B of the EIA Report
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 8.1.1
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 8.1.1.1
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 8.1.3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 8.6.1
g) an identification of any areas to be avoided, including buffers;	Section 8.6.1
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	The layout map was provided by the Project Applicant. Project Sensitivity Map provided in Appendix C
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 8.1.4
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	Section 8.6.1
k) any mitigation measures for inclusion in the EMPr;	Section 8.7, 8.8
l) any conditions for inclusion in the environmental authorisation;	Section 8.9
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8.8
n) a reasoned opinion-	Section 8.9
i. as to whether the proposed activity or portions thereof should be authorised; and	
ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q) any other information requested by the competent authority.	

8 VEGETATION AND WETLAND ASSESSMENT

8.1 INTRODUCTION AND METHODOLOGY

8.1.1 Scope and Objectives

Kyllinga Consulting has been appointed as a sub-consultant of Pachnoda Consulting, to conduct a vegetation and watercourse assessment, as part of the ecological assessment for the proposed development of a solar photovoltaic (PV) facility (Boven Solar PV4) on the remaining extent of Boven Rugszeer Farm 169, north-east of Kenhardt in the Northern Cape. This project forms part of a total of seven solar PV facilities proposed for the Phase 2 Nieuwehoop Solar PV Park.

8.1.2 Terms of Reference

Vegetation communities and plant species assessment:

- Identification of plant communities / habitat types on site;
- Compilation of a species list of the communities;
- Lists of medicinal and invasive plant species on site;
- Search for Red Data plant species and species of conservation importance on site;
- Determining the sensitivity and conservation importance of the vegetation on site; and
- Impact assessment and proposed mitigation measures, based on the supplied information.

Wetland assessment:

- Desktop delineation of the wetlands within 500 m of the site on aerial photographs;
- Desktop delineation of all drainage lines, including non-perennial streams, on site;
- Field verification of the watercourses on site according to the Department of Water Affairs (DWA) wetland and riparian delineation guidelines;
- Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) assessments for the wetland units;
- Buffer zone recommendations; and

8.1.3 Approach and Methodology

8.1.3.1 Site visit

The site visit took place from 4 to 11 December 2015. The site visit took place during the summer season and in a drought period and several annual species were dormant. A survey is recommended after the rainy season when annuals emerge. Although this will not change the vegetation description significantly, the species lists will be improved significantly.

8.1.3.2 Vegetation Assessment

The aerial photographs of the site were examined prior to the site visit and the vegetation communities identified. The vegetation across the entire study unit, including the proposed Boven PV2- PV3, PV4 as well as the Gembok PV3-, PV4, PV5 and PV6 sites were included in the assessment. The vegetation was recorded along random transect walks and the cover-abundance (Table 8.4) of the vegetation noted. Species were recorded in each community. The vegetation was recorded along transects to maximize the area covered, this increased the number of species recorded. The species data were then summarised into species lists per vegetation unit. The species list per vegetation unit is therefore not confined to a single site, but includes information from several proposed sites merged into a single unit. The vegetation units present on this site are noted, but should be viewed in conjunction with the other described vegetation units.

Table 8.4: Braun-Blanquette cover-abundance scale used (Kent & Coker1992).

Value	Cover
+	Less than 1% crown cover – As single individual or a few very small individuals.
1	1-5% crown cover
2a	6-12% crown cover
2b	13-25% crown cover
2m	Numerous small individuals or seedlings spread across the site, with a crown cover of no more than 25%
3	26-50% crown cover
4	51-75% crown cover
5	76-100% crown cover

A search for species of conservation importance was completed. The habitats of the species expected on site were investigated in an attempt to determine whether such species are present on site.

8.1.3.3 Watercourse Assessment

Watercourse Delineation

Aerial photographs of the site were examined. All the watercourse areas on site and within 500 m of the site were delineated based on the aerial photographs.

The watercourses (including wetlands, river and drainage features) on site were delineated according to the Department of Water Affairs (DWA) wetland and riparian delineation guideline (DWA 2005). Several indicators are used to delineate riparian and wetland areas. The indicators include:

- Vegetation indicator;
- Terrain unit indicator;
- Soil form indicator; and
- Soil wetness indicator.

Several first order drainage lines, that cannot be defined as a riparian or wetland area, are present on site and were delineated on the aerial photographs. These systems are also important watercourses, even though they cannot be classified as riparian or wetland areas.

Present Ecological State

The Present Ecological State (PES) of a watercourse is an indication of change from the natural condition. There are no methods applicable to calculating the PES of watercourses that are not wetland or riparian areas. An estimate of the PES status of the watercourse is given in this report, based on the experience of the specialist. A description of PES classes is included in Table 8.5.

Table 8.5: Present Ecological State categories (from Macfarlane et al 2009).

Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	2-3.9	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8 - 10	F

8.2 IMPACT ASSESSMENT

The Impact Assessment took the nature, extent, intensity, duration and probability of the impacts into consideration to determine the significance of the impact. Scores were allocated as follows:

<p>Extent:</p> <ul style="list-style-type: none"> • Site; • Local (<10 km from site); • Regional (<100 km of site); • National; or • International. 	<p>Probability:</p> <ul style="list-style-type: none"> • Improbable (little or no chance of occurring); • Probable (<50% chance of occurring); • Highly probable (50 – 90% chance of occurring); or • Definite (>90% chance of occurring regardless of prevention measures).
<p>Duration:</p> <ul style="list-style-type: none"> • Very short term (instantaneous); • Short term (less than 1 year); • Medium term (1 to 10 years); • Long term (the impact 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)). 	<p>Consequence:</p> <ul style="list-style-type: none"> • Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease); • Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease); • Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease); • Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or • Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

Significance:

The significance is calculated by multiplying the Consequence by the Probability. The scoring indicates the significance of the impact as follows:

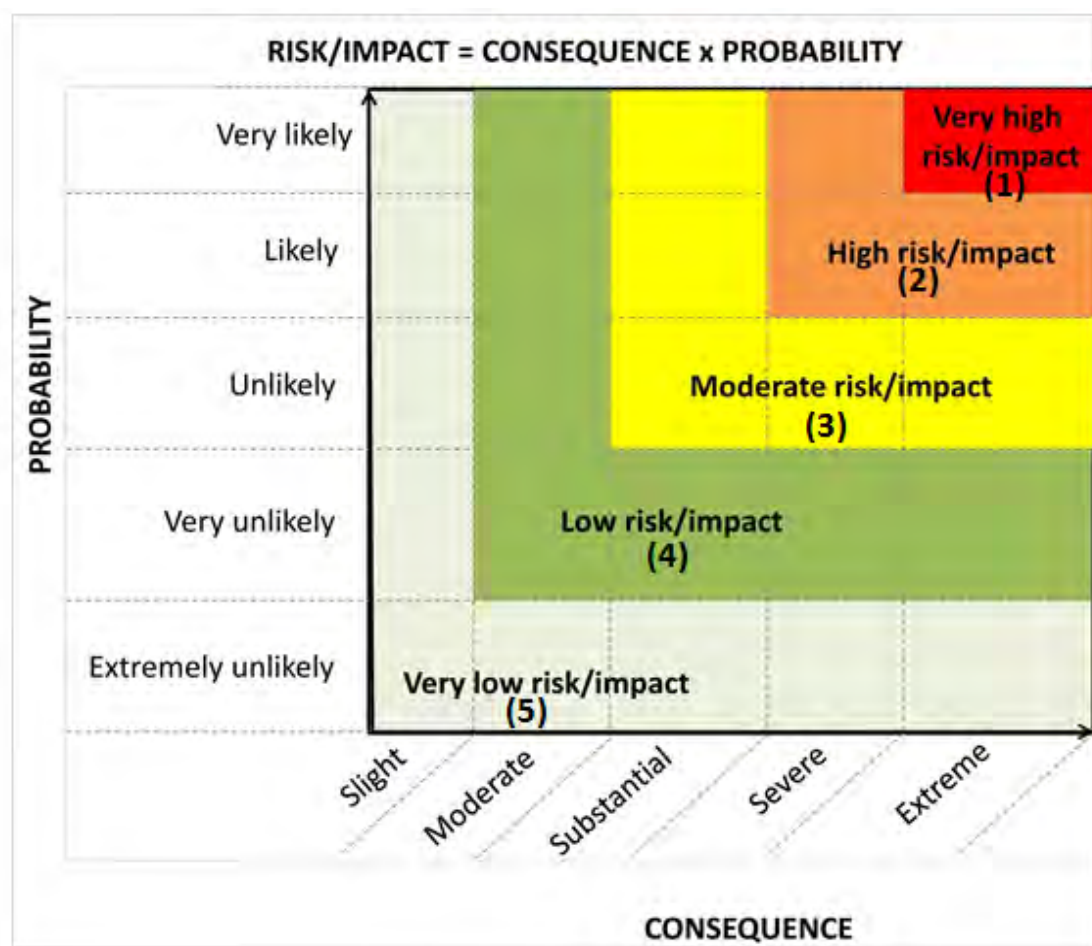


Figure 8.1: Guide indicating the significance of an impact based on the consequences and probability of the impact.

8.2.1 Assumptions and Limitations

- The site visit took place in December 2015 during a drought, when a number of species are dormant. It is therefore expected that several annual species were not observed during the site visit.
- No baseline monitoring was undertaken as part of this assessment.
- A list of 12 applications in the surroundings was taken into account for the cumulative impact (Refer to Table 4.8 in Chapter 4 of the EIA Report). It is however possible that additional developments are planned in the area, but no notices have been received and the projects are therefore not considered in the cumulative impact
- All individuals of the observed protected species could not be marked on site, since there were too many and it was too time intensive.

8.2.2 Source of Information

Information used in the vegetation and watercourse assessment includes:

- The satellite image used for delineation is the Google Earth images of the site, as well as the Birds Eye satellite images from the Garmin site;
- The 1:50 000 topographical map from the Department of Surveys and Mapping;
- The National Freshwater Ecosystem Priority Areas (NFEPA) database;
- SANBI's biodiversity information system (SIBIS) data base;
- Resource Quality Information Services (RQIS) database from the Department of Water and Sanitation (DWS); and
- Process information sourced from the client.

8.3 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO VEGETATION AND WATERCOURSE IMPACTS

The proposed project consists of a solar PV farm and associated infrastructure. Several impacts may result from the project activities.

Solar PV plant:

- The proposed solar plant consists of numerous solar panels covering most of the site. It should be noted that the area proposed for the development of the solar PV facility is 220 ha. However, the entire site will not be cleared of vegetation. Vegetation will not be cleared underneath the solar PV panels. Only 50 % the proposed site is likely to be covered by the panels and only 10 % will be occupied by foundation infrastructure. Less than 10% of the vegetation will be cleared. The proposed solar panels are mounted to maximize the amount of sunlight. This will result in maximum shading of the surroundings.
- The solar panels are impervious to rain and the water will run off the panels.
- Water will be collected in swales where necessary.
- The solar panels are mounted on poles that must be firmly embedded in the soil to prevent collapse. Soil disturbance will therefore necessarily take place at each solar panel.
- Access routes will be needed to each of the seven sites.

Powerlines:

- The proposed project includes powerlines from the proposed solar plant to the substation. Since powerlines are raised the impacts are mainly associated with the:
 - Pylons,
 - Access road,
 - Vegetation clearing under the powerlines.
- Impacts are mostly associated with vegetation clearing, soil erosion and soil compaction.
- Due to the low cover of the vegetation, no mowing is expected to be necessary on site.

8.4 DESCRIPTION OF THE AFFECTED ENVIRONMENT

8.4.1 Vegetation type

The vegetation on the site falls in the Bushmanland Arid Grassland (NK63: Mucina and Rutherford 2006). This vegetation type is present in the Northern Cape Province, between Aggeneys and Prieska, to the north of the Bushmanland Basin and to the south of the desert vegetation. The vegetation type is located on plains, sparsely vegetated by grassland (dominated by *Stipagrostis* species) and with semi-desert characteristics. During years of abundant rainfall annual species flower abundantly. The soils are mostly a red-yellow apedal soil of less than 300 mm deep, but exceeding this depth in approximately a fifth of the area. The area has low rainfall, with a mean annual precipitation (MAP) of between 70 and 200 mm. The vegetation type is classified as Least Threatened. Although a very small area is statutorily conserved, very few areas have been transformed.

A few vegetation units falling into the Bushmanland Vloere vegetation type (AZi5: Mucina and Rutherford 2006) is present a short distance outside the site investigated. Salt pans and broad riverbeds are included in this vegetation type, as well as several dysfunctional river tributaries. The vegetation type is present on flat and very even surfaces. The soil is mostly silt and clayey alluvial soils and often has a high salt content. In some areas, erosion can be considerable. The vegetation type is classified as Least Threatened in Mucina and Rutherford (2006).

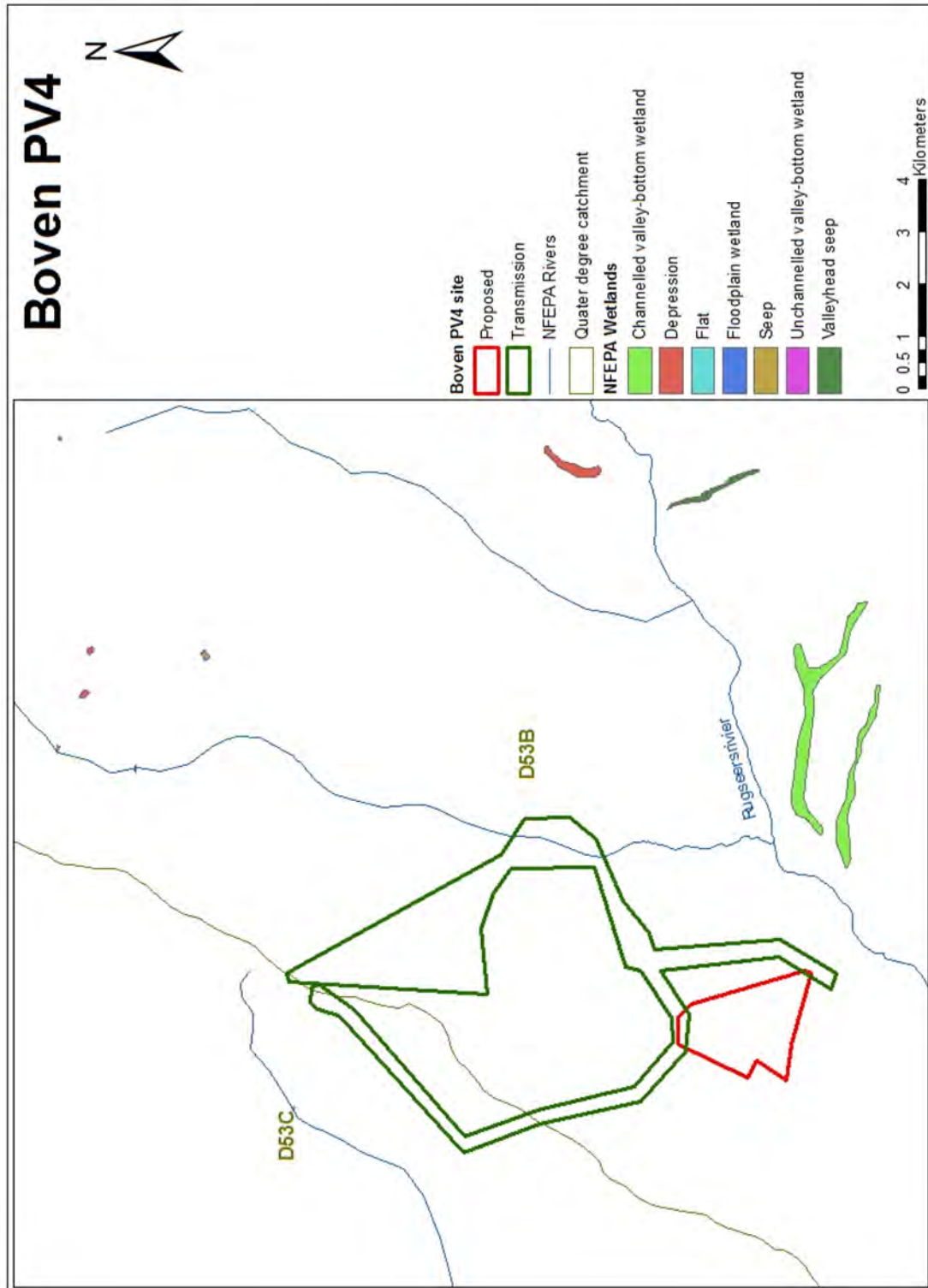


Figure 8.2: Quaternary catchment and National Freshwater Ecosystems Priority Area (NFEPA) wetlands around the site.

8.4.2 Quaternary Catchments

A portion of the Boven Solar PV4 site is located in quaternary catchment D53B and the remainder of the site is located in quaternary catchment D53C.

Resource Quality Information Services Database

The DWS has compiled a Resource Quality Information Services (RQIS) database of different resources in South Africa. This system is not intended as an extension or replacement of National Freshwater Ecosystems Priority Areas (NFEPA), but as a separate system. The Present Ecological State (PES) and Ecological Importance and Ecological Sensitivity (EI&ES) are included in this database and are used for the first level of a desktop ecological water reserve determination and for Ecological Water Resource Monitoring (EWRM) (RQIS 2015).

According to the RQIS database the proposed site has a PES of B (Largely Natural), the EI is Moderate and the ES is Low.

The National Freshwater Ecosystems Priority Areas

The NFEPA atlas indicates three rivers in the immediate surroundings of the investigated areas. The river to the south of the site is the Rugseersrivier, the other two are unnamed. These rivers fall in class B, which is largely natural. There are, therefore, few impacts on the river systems in the area. These systems are non-perennial river systems and only have flow during the rainy season.

8.5 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The following permits are required:

- Water Use Licence (WUL) from the Department of Water Affairs (DWA) under Section 21 c and i under the National Water Act 36 of 1998;
- Plant removal permit for *Aloe dichotoma*, *Boscia albitrunca*, *Boscia foetida* and *Hoodia gordonii* from the provincial Department of Environment and Nature Conservation under the Northern Cape Nature Conservation Act; and
- A permit for the removal of *Boscia albitrunca* from the Department of Agriculture, Forestry and Fishery (DAFF) under the National Forestry Act 84 of 1998 (NFA).

8.6 IDENTIFICATION OF KEY ISSUES

8.6.1 Key Issues Identified During the Scoping Phase

The potential botanical and watercourse issues identified during the scoping phase of this EIA process include:

- The removal of primary vegetation;
- The removal of threatened or protected species;
- Increased alien and invasive species infestation due to disturbance;
- Soil compaction and wheel track entrenchment; and
- Increased erosion and sedimentation on site.

Comments were received on the scoping report from various stakeholders. The comments pertaining to the vegetation and watercourse assessment are included Table 8.6 below, along with a response.

Table 8.6: Summarised comments from stakeholders.

Comment	Commenter	Response
The anticipated impacts on NFA listed protected tree species must be assessed in the EIA phase and an accurate estimation given of the number of protected trees per species and the size classes to be destroyed as a result of the proposed development.	DAFF	An estimate is included in Section 8.7.1 of the EIA report.
The Department assess the cumulative impacts on protected trees from all seven proposed solar facilities, since they are located in the same geographical area. The total proposed area of vegetation clearing is approximately 2 285 ha on a farm area of 14 380 ha. This may have significant impacts on keystone species. In case of unavoidable impacts environmental offsets may be required.	DAFF	This is included in Section 8.9 of the EIA report. It should be noted that the total area proposed for the development of the seven solar PV facilities is 1 540 ha (i.e. 220ha x 7). However, the entire site will not be cleared of vegetation. Vegetation will not be cleared underneath the solar PV panels. Only 50 % of each proposed site is likely to be covered by the panels and only 10 % will be occupied by foundation infrastructure. Less than 10% of the vegetation will be destroyed. This is less than 300 ha out of a total farm area of approximately 21 000 ha for all proposed developments.
A permit for the removal of Quiver Trees (<i>Aloe dichotoma</i>) must be obtained from the Department of Environment and Nature Conservation. There is a moratorium on the removal of this species from nature.	DAFF	Transplanting of the <i>Aloe dichotoma</i> trees that cannot be avoided must be considered rather than removal from the wild. The relevant permit/s will be obtained from the Northern Cape Department of Nature Conservation.
The full assessment completed during the EIA phase must be supplied to DAFF when available. All possible efforts must be made to avoid sensitive areas and minimize impacts on slow growing protected trees. Infrastructure must be placed in areas where it will have the least impact on protected trees.	DAFF	The assessment will be supplied to DAFF. The assessment has identified areas of medium and high sensitivity that must be avoided by the proposed development. Buffer zones are also recommended to avoid sensitive areas.
The number of protected trees affected by the proposed development must be provided to the department for comparison to other projects in the area to determine cumulative loss.	DENC	Refer to Section 8.6.1 of this report.

8.6.2 Identification of Potential Impacts/risks

The potential impacts identified during the assessment in the EIA phase are:

8.6.3 Construction Phase

- Loss of species of conservation importance;
- Loss of primary vegetation;
- Soil compaction and vehicle wheel track entrenchment;
- Erosion and sedimentation;
- Change in flow patterns due to erosion and sedimentation;
- Establishment of alien and invasive species; and
- Pollution and littering.

8.6.4 Operational Phase

- Loss of species of conservation importance;
- Loss of primary vegetation;
- Soil compaction and vehicle wheel track entrenchment
- Erosion and sedimentation;
- Change in flow patterns due to erosion and sedimentation;
- Establishment of alien and invasive species; and
- Pollution and littering.

8.6.5 Decommissioning Phase

- Loss of species of conservation importance;
- Loss of primary vegetation;
- Soil compaction and vehicle wheel track entrenchment;
- Erosion and sedimentation;
- Change in flow patterns due to erosion and sedimentation (positive);
- Establishment of alien and invasive species; and
- Pollution and littering.

8.6.6 Cumulative impacts

- Loss of primary vegetation
- Loss of species of conservation importance
- Erosion and sedimentation
- Change in flow patterns due to erosion and sedimentation
- Establishment of alien and invasive species

8.7 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

8.7.1 Results of the Field Study

8.7.1.1 Vegetation units

The vegetation units described in this section include all the vegetation types recorded for the entire study area, including the seven proposed sites for the proposed Boven PV2-, PV3, PV4 as well as the Gemsbok PV3-, PV4, PV5 and PV6 sites. The species present throughout the different vegetation units are mostly similar, but the dominant species varies. The vegetation units on site cannot be classified into clearly defined vegetation units, but occur along an environmental gradient. The gradients are mostly along substrate and moisture axes. It is however possible to identify three main vegetation units on site, as well as several sub-units. The following vegetation types were identified in the area:

1. Short shrubveld
 - 1.1. *Salsola aphylla* – *Stipagrostis uniplumis* short shrubveld
 - 1.2. *Zygophyllum microphyllum* – *Pteronia mucronata* short shrubveld on calcrete
2. Rocky outcrops
 - 2.1. *Aloe dichotoma* – *Tetraena retrofracta*
 - 2.2. *Tetraena retrofracta* quartz outcrop
 - 2.3. *Salsola aphylla* – *Stipagrostis obtusa* rocky areas
3. Watercourses
 - 3.1. *Prosopis glandulosa* watercourse
 - 3.2. *Rhigozum trichotomum* watercourse
 - 3.3. *Roepera morgesana* floodplain

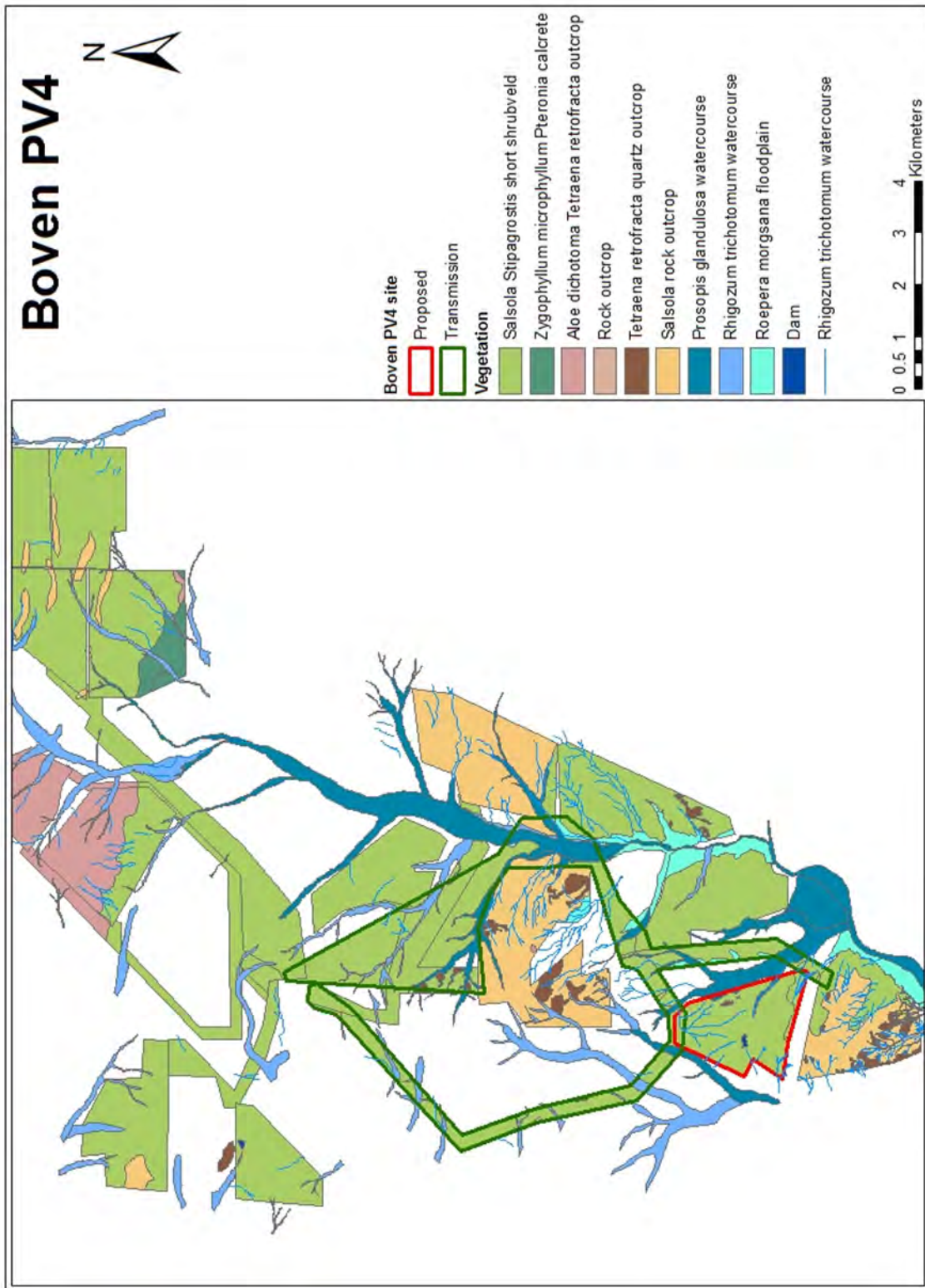


Figure 8.3: Overview of the vegetation units in the greater study area.

Short Shrubveld (Unit 1)

The dominant vegetation type in the area is short shrubveld. There are two sub-units in the Short Shrubveld vegetation type on site, namely:

- Sub unit 1.1: *Salsola aphylla* – *Stipagrostis uniplumis* short shrubveld (sub-unit 1.1); and
- Sub unit 1.2: *Zygophyllum microphyllum* – *Pteronia mucronata* short shrubveld on calcrete (sub-unit 1.2).

These two vegetation units are very similar in structure, but the dominant species are different. In addition, the substrate on which the vegetation unit occurs is different. Vegetation sub-unit 1.2 occurs on fairly dense outcrops of calcrete. Although some calcrete is present in portions of sub-unit 1.1, the calcrete does not affect the dominant species.

Dominant species in sub-unit 1.1 is *Salsola aphylla*, *Lycium bosciifolium*, *Stipagrostis uniplumis* and *Zygophyllum flexuosa*. The unit is mostly located on sandy soils, but several portions have rocky elements. This unit is the least rocky of the terrestrial units. The watercourses vegetation units are mostly sandier than this unit. This unit is the dominant vegetation unit in the area. A few scattered individuals of *Boscia albitrunca* are present in this unit, at very low densities, as well as scattered individuals of *Aloe dichotoma*, which are mostly located close to the border with another vegetation unit. No individuals of *Hoodia gordonii* were observed in this unit, and it is unlikely that this species would be present on this site. This vegetation unit is still in a primary condition, but not from a threatened vegetation type. The sensitivity and conservation importance of this vegetation type is therefore considered to be Moderate.

Sub-unit 1.2 is dominated by *Zygophyllum microphyllum*, *Pteronia mucronata* and *Salsola aphylla*. This unit is exclusively located on dense patches of calcrete. The only protected species observed in this vegetation unit is scattered individuals of *Boscia albitrunca*. The species is however very rare in this vegetation unit. The vegetation unit does not fall within a threatened vegetation type, but the vegetation is primary vegetation. The sensitivity and conservation importance of this vegetation type is therefore considered to be Moderate.



Figure 8.4: Image of the *Zygophyllum microphyllum* – *Pteronia mucronata* short shrubveld on calcrete (unit 1.2).

Rocky outcrops (Unit 2)

This vegetation unit varies from piles of rock with very little vegetation to vegetation with very rocky soil. The following sub-units are present:

Sub-unit 2.1: *Aloe dichotoma* – *Tetraena retrofracta* rocky outcrop

Sub-unit 2.2: *Tetraena retrofracta* quartz outcrop

Sub-unit 2.3: *Salsola aphylla* – *Stipagrostis obtusa* rocky areas

Vegetation sub-unit 2.1 appears to be on large gneiss rocks from the Kalahari Group. These are clear rocky outcrops and are mostly located on the northern portion of the site. Dominant species include *Aloe dichotoma*, *Tetraena retrofracta*, *Aptosimum spinescens* and *Enneapogon desvauxii*. Several protected plant species were observed in this unit including *Aloe dichotoma* (approximately 1 / 1-5 ha), *Boscia albitrunca* (approximately 1 / 50 ha), *Boscia foetida* (approximately 1 / 50 ha) and *Hoodia gordonii* (approximately 1 / 100 ha). Given the large number of protected species, the vegetation unit is considered to be of High conservation importance and sensitivity.

The quartz outcrops of sub-unit 2.2 is dominated by *Tetraena retrofracta* and is the only vegetation unit where *Ruschia* sp is consistently encountered. Other dominant species include *Stipagrostis uniplumis*, *Zygophyllum flexuosa* and *Rhigozum trichotomum*. This unit is most dominant in the southern portion of the site and largely occurs interspersed with sub-unit 2.3. The inconspicuous protected species *Anacampseros papyracea* were observed in this unit. The inconspicuous protected species *Dinteranthus pole-evansii* may be present in this sub-unit, but was not observed during the site visit. This species is very difficult to locate when not in flower and may become dormant during drought periods. Due to the

presence of a single protected species, this vegetation sub-unit has conservation importance and sensitivity rating of Moderate to High.

Sub-unit 2.3 is present interspersed with sub-unit 2.2 and is mostly located in the central portion of the investigated area. The dominant plant species are *Salsola aphylla*, *Stipagrostis obtusa* and *Rhigozum trichotomum*. This unit is the least rocky sub-unit of vegetation unit 2 and is a transitional unit between the rest of vegetation unit 2 and vegetation unit 1. The protected trees, *Aloe dichotoma*, *Boscia albitrunca* and *Boscia foetida*, are present in this unit. *Boscia albitrunca* is rare (less than 1 / 10 ha) and the *Aloe dichotoma* (approximately 1 / 10 ha) is patchily distributed and can be avoided. Although *Boscia foetida*, which is numerous (approximately 1 / 5 ha), is protected under the Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA), the conservation of this species is not a priority. The conservation importance and sensitivity of the sub-unit is Moderate to High.



Figure 8.5: *Aloe dichotoma* in the *Aloe dichotoma* – *Tetraena retrofracta* rocky outcrop vegetation unit (2.1)

Watercourses (Unit 3)

Three watercourse vegetation units are present in the study area. Three sub-units are present in the vegetation unit:

- Sub-unit 3.1: *Prosopis glandulosa* watercourse
- Sub-Unit 3.2: *Rhigozum trichotomum* watercourse
- Sub-Unit 3.3: *Roepera morgsana* floodplain

Vegetation unit 3.1, the *Prosopis glandulosa* vegetation unit, is associated with the larger watercourses on site. The vegetation unit is on alluvial soil and the only dominant species is *Prosopis glandulosa*, which

is a Category 3 invasive species. The vegetation unit has the lowest species diversity of the different sub-units. From a vegetation point of view, the unit is of Low conservation importance, but since the unit is associated with watercourse, the unit is of High conservation importance and sensitivity the unit therefore received an overall conservation importance of Moderate to High.

Vegetation sub-unit 3.2 is associated with small watercourses on site, including first order drainage lines. The substrate in the unit is variable, but some alluvial soil is present in the unit, even when the unit is located in rocky terrain and the alluvial soil is shallow. The vegetation unit is normally very narrow and is therefore indicated as a separate line shapefile. It is recommended that the line and a 10 m buffer zone is considered as part of the vegetation unit. The dominant species in this unit is *Rhigozum trichotomum*, with *Roepera morgsana* and *Lycium bosciifolium*. These narrow systems are the starting point of the site drainage and drain into the larger systems downstream. Since these units are very narrow, some protected species are present in the edges of the system, including *Aloe dichotoma* and *Boscia foetida*, especially where these units are located within a vegetation unit with protected species present. Since these systems are associated with watercourses, the conservation importance and sensitivity of the systems is High.

The floodplain (unit 3.3) is located on the level areas adjacent to unit 3.1. The unit is located on sandy soil and has taller vegetation than vegetation unit 1. The dominant vegetation is *Roepera morgsana*, *Rhigozum trichotomum*, *Lycium bosciifolium* and *Eragrostis lehmanniana*. The only protected species recorded in this unit is *Boscia foetida*. From a vegetation point of view, the unit has a Moderate sensitivity, but since the unit is associated with a watercourse unit the conservation importance and sensitivity is Moderate to High.

8.7.1.2 Vegetation units recorded on site

The vegetation units recorded on site include:

- *Salsola aphylla* – *Stipagrostis uniplumis* short shrubveld (Sub-unit 1.1): Moderate sensitivity
- *Aloe dichotoma* – *Tetraena retrofracta* rock outcrop (Sub-unit 2.1): High sensitivity
- *Rhigozum trichotomum* watercourse (Sub-unit 3.2): High sensitivity

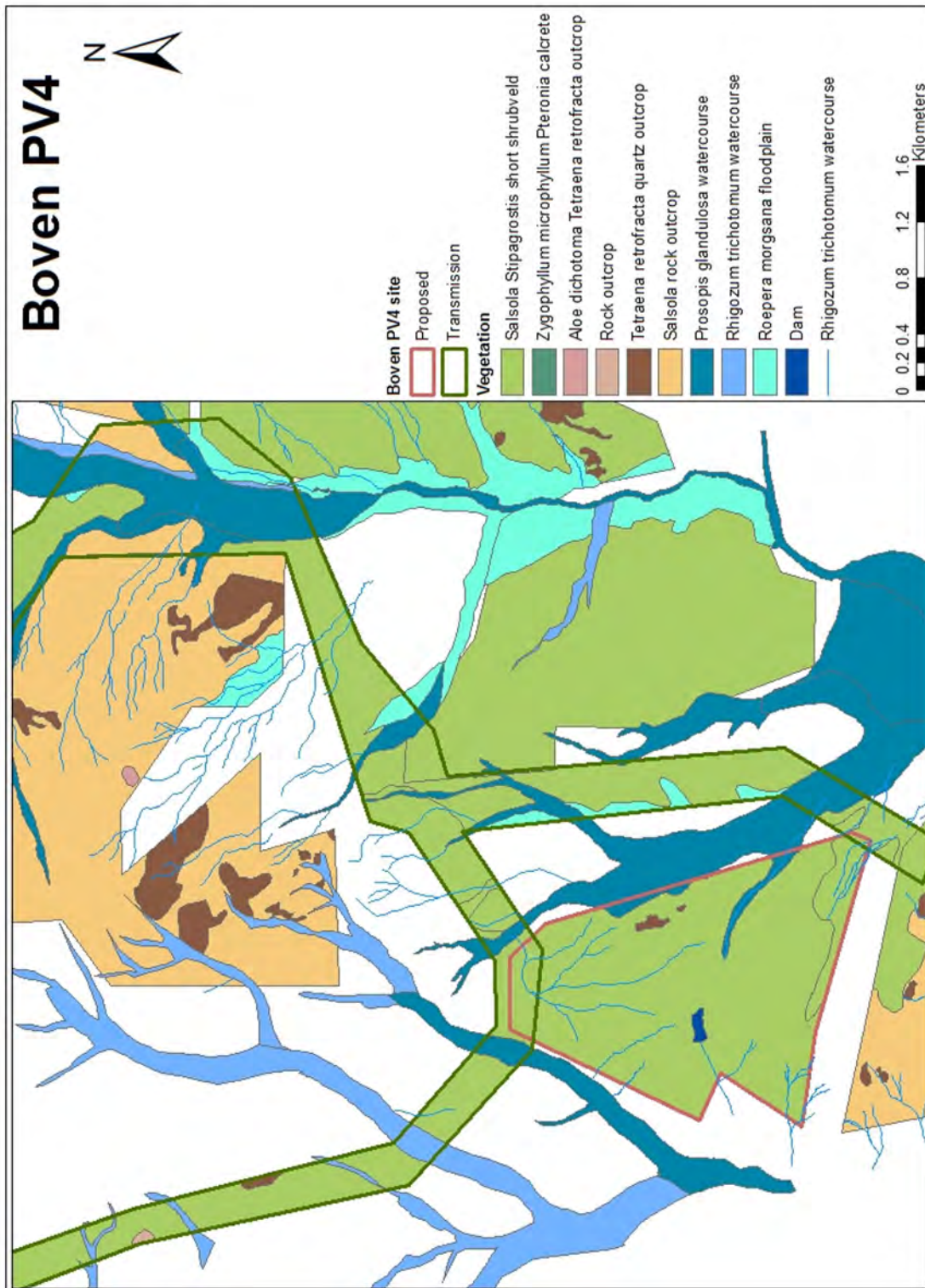


Figure 8.6: Vegetation units present in the Boven PV4 site.



Figure 8.7: View of the study site.

8.7.1.3 Invasive species

The Alien and Invasive Species (AIS) Regulations were published in the Government Gazette of 1 August 2014. The regulations are under the National Environmental Management Biodiversity Act (Act no 10 of 2004) (NEMBA). The only invasive species recorded on site is *Prosopis glandulosa*, which is very dominant along the drainage lines and adjacent to dams. A few individuals are also scattered in small patches of disturbance.

8.7.1.4 Medicinal species

South Africa has a wide diversity of plant species and a rich cultural heritage. A large number of species are still used in traditional medicine and several species were also investigated for medicinal development. Indigenous vegetation is mostly used, but a few alien species are also used for medicinal purposes.

The species *Dicoma capensis* (“koorsbossie”) is present on site. Although this species has medicinal uses, there are no signs of use and the species is common. This is therefore not a significant impact.

8.7.1.5 Species of conservation importance

A list of species recorded in quaternary catchments 2921AA, 2921AB, 2921AC and 2921AD were downloaded from SIBIS. These species were compared to the IUCN Red Data lists. Species of conservation importance present in these quarter degree grids are recorded in Table 7 below.

The species *Aloe dichotoma* and *Hoodia gordonii* were observed on site. *Aloe dichotoma* is a Vulnerable species, which is specially protected under the Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA). The removal or movement of this species will require a permit from Cape Nature. Obtaining a

permit for the removal of *Aloe dichotoma* is likely to be problematic. The species will have to be moved to appropriate habitat outside the proposed development area. This will require planning that takes the seasons and rainfall into account.

Hoodia gordonii is a Data Deficient species, but is protected under NEMBA and specially protected under the NCNCA.

It is also likely that *Dinteranthus pole-evansii* may be present on site on the quartz outcrops on site. The species is very inconspicuous and would be very difficult to observe when not in flower. A search should therefore be conducted for the species during the flowering season should development take place on the quartz outcrops.



Figure 8.8: *Hoodia gordonii* observed in vegetation unit 2.1.

Table 8.7: Species of conservation importance recorded in the area.

Family Name	Species Name	IUCN	Habitat	Recorded on site?
FABACEAE	<i>Vachellia erioloba</i> (= <i>Acacia erioloba</i>)	Declining	Deep sandy soil in open savanna and on alluvial soils. Adapted to dry conditions.	None observed
ASPHODELACEAE	<i>Aloe dichotoma</i>	VU	Present in rocky hills in arid areas.	Yes, observed on site
MESEMBRYANTHEMACEAE	<i>Dinteranthus pole-evansii</i>	VU	Well-drained, sandy soils associated with quartz stones and pebbles.	Possible, none observed
APOCYNACEAE	<i>Hoodia gordonii</i>	DDD	Occurs in a wide variety of arid habitats from coastal to mountainous, also on gentle to steep shale ridges, found from dry, rocky places to sandy spots in riverbeds.	Yes, observed on site
ASTERACEAE	<i>Senecio glutinarius</i>	DDT	Rocky areas.	None observed

In addition, *Boscia albitrunca* and *B. foetida* were observed on site. *Boscia albitrunca* is a protected species under the NFA, as well as the NCNCA, and *Boscia foetida* is protected under the NCNCA. *Boscia albitrunca* is fairly rare, with less than one individual present per 50 ha. *Boscia foetida*, a similar species, is much more abundant. The individuals of *Boscia albitrunca* are on average approximately 2 m high, with a stem circumference of approximately 300 to 400 mm.

8.7.1.6 Watercourses identified on site

Several watercourses are delineated on the 1:50 000 topographical maps of the area. These are non-perennial. The watercourse units, and associated vegetation unit, identified on site include:

- Non-perennial streams – Mostly vegetation Sub-unit 3.1 (*Prosopis glandulosa* watercourse); and
- First order drainage lines – These units mostly correspond to vegetation Sub-unit 3.2 (*Rhigozum trichotomum* watercourse).

The *Prosopis glandulosa* watercourse is only present in the proposed transmission line area.

The non-perennial streams and the first order drainage lines have alluvial soils, although the soil is often very shallow in the non-perennial streams. The soil in the floodplain area is a deep sandy soil and better structured than the soil in the non-perennial streams. A clear change in vegetation is present in these units, also refer to the vegetation description in Section 8.6.1.1.3 of this report.

The non-perennial streams and the first order drainage lines have alluvial soils, although the soil is often very shallow in the non-perennial streams. A clear change in vegetation is present in these units, also refer to the vegetation description in Section 8.6.1.1.3 of this report. The non-perennial stream can be classified as a riparian zone, but no aquatic assessments can take place due to the lack of water for most of the year. The floodplain zone is a marginal riparian zone. This section may occasionally be flooded during large rainfall events. Due to the presence of *Prosopis glandulosa*, the watercourse falls within PES class B/C. These watercourses are of high conservation importance, but a moderate to high sensitivity and require a 32m buffer zone.

The first order drainage lines on site is mostly very narrow, in many cases only approximately 1m wide and due to the scale of the assessment could not be delineated as a polygon feature. A line feature was however created for each of these systems. The drainage lines mostly have a clear change in vegetation dominance. These areas cannot be clearly defined as riparian or wetland areas, although some riparian characteristics are present. They are however definitely watercourses and are therefore of high conservation importance and falls within PES class A. These drainage lines also require a buffer zone, but the buffer zone can possibly be decreased to a 20m buffer zone.

8.7.2 Potential impacts identified during the construction, operation and decommissioning phases of the proposed solar PV facility:

8.7.2.1 Loss of species of conservation importance

Construction phase

- Several species of conservation importance are present on site, including some tree species, including *Aloe dichotoma*, *Boscia albitrunca* and *B. foetida* (refer to Section 8.6.1.5)
- These species may be removed to accommodate the construction camp or to erect the solar panels. This will result in the loss of these individuals.
- The species of conservation importance on site will be affected and the impact will be permanent
- The significance of the impact is Moderate that may be reduced to Low significance with mitigation measures.

Operation phase

- The shading effect from solar panels is likely to affect the species composition and plant growth on site.
- Emerging seedlings of protected species may, therefore, be affected by the shading. The species may therefore not regenerate in the developed area.
- Large numbers of seedlings are not expected during the project cycle and the significance of the impact is therefore considered to be Low before and after mitigation.

Decommissioning phase

- Some vegetation may be destroyed during decommissioning, which may result in the loss of species of conservation importance.
- The decommissioning will however result in the habitat being made available for these species.
- The impact during decommissioning is of Low significance.

Mitigation:

- No development can be allowed to take place within the Moderate to High sensitivity areas or buffer zones.
- A suitably qualified Environmental Control Officer (ECO) must be appointed to implement the Environmental Management Programme (EMPr) and the relevant conditions of the Environmental Authorisation (should this be granted) and must contractually be held responsible for the implementation thereof.
- No unauthorised movement of construction vehicles or workers are allowed outside the fenced area and approved roads during construction. Construction vehicles and workers should be restricted to the fenced off construction area.
- Formal briefings must be held to inform the construction workers about the rules to be observed on site and why they are necessary. Financial penalties should be considered in the event of deliberate contraventions of the rules. No construction related activities or structures, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the moderate to high or the high sensitivity areas.

Cumulative Impact

The site investigated is not the only being investigated for proposed solar PV farms in the area. The total area proposed for solar panels in the investigated site is significant and several other solar projects are also proposed in the area. It should be noted that the total area proposed for the development of the seven solar PV facilities is 1 540 ha (i.e. 220 ha x 7). However, the entire site will not be cleared of vegetation. Vegetation will not be cleared underneath the solar PV panels. Only 50 % of each proposed site is likely to be covered by the panels and only 10 % will be occupied by foundation infrastructure. Less than 10 % of the vegetation will be destroyed. This is less than 300 ha out of a total farm area of approximately 21 000 ha for all developments. The protected species are however mostly trees and since trees will interfere with the solar panels it is expected that the majority of the protected species present will be removed in the area covered by the PV panels. Although it is stated that only approximately 10% of the site will be cleared of vegetation, the construction activities will result in trampling of the vegetation across the entire area covered by the PV panels, along with the additional clearing of trees and shrubs. In addition, the species present on site required full sun and the shading effect will limit seed germination. The loss of only a few individuals of conservation importance on a project site may be acceptable, but the cumulative loss from all project sites potentially may be High. This impact can be mitigated by avoiding large populations of protected species and by transplanting as many individuals from protected species as possible. The significance of the cumulative impact is Moderate after mitigation.

8.7.2.2 Loss of primary vegetation on site

Construction phase

- Most of the vegetation on site is untransformed (primary) vegetation and it is expected that portions of the vegetation will be removed for construction purposes and that most of the vegetation will receive some damage due to construction activities.
- The impact will be restricted to the development areas and the significance of the impact is Moderate, but can be lowered to Low significance.

Operational phase

- It is expected that the shading effect from the solar panels will change the species composition on site and may result in some bare patches.
- Tree species and large shrub species will affect the solar panels and will have to be removed. This will result in additional changes to the vegetation composition.

The significance of the impact is Low, since the vegetation will already be affected by the construction activities on site.

Decommissioning phase

- It is unlikely that additional areas of primary vegetation will be affected during decommissioning.
- Rehabilitation of the vegetation unit will result in a positive impact.
- The vegetation is unlikely to closely resemble primary vegetation after rehabilitation, but the vegetation cover will definitely improve should correct rehabilitation measures be implemented.

Mitigation:

- No development can be allowed to take place within the High sensitivity areas or buffer zones. Development should avoid the Moderate to High sensitivity areas.
- A suitably qualified ECO must be appointed to implement the EMP and the relevant conditions in the Environmental Authorisation for the project and must contractually be held responsible for the implementation.
- The construction areas must be fenced off prior to construction.

- No movement of vehicles or people are allowed outside the fenced area or approved roads during construction.
- No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the moderate to high or the high sensitivity areas.
- A comprehensive vegetation rehabilitation plan for the site must be compiled for implementation during decommissioning.
- The vegetation rehabilitation plan must be compiled before decommissioning commences and must take the most recent features or conditions of the site into account.

Cumulative Impact

This is not the only site being investigated in the area for the proposed development of solar PV farms. The total area proposed for solar panels in the investigated site is significant. It should be noted that the total area proposed for the development of the seven solar PV facilities is 1 540 ha (i.e. 220 ha x 7). The total area of the proposed solar PV projects in the area comprises 3 040 ha which includes the 1 540 of the seven projects; 750 ha (250 ha x 3) for the Mulilo Nieuwehoop Solar PV Phase 1 development and 750 ha for the Scatec solar PV Projects (250 ha x 3). However, the entire site will not be cleared of vegetation. Vegetation will not be cleared underneath the solar PV panels. Only 50 % of each proposed site is likely to be covered by the panels and only 10 % will be occupied by foundation infrastructure. Less than 10 % of the vegetation will be cleared for construction purposes. This is less than 300 ha out of a total farm area of approximately 21 000 ha for all developments. Although it is stated that only approximately 10% of the site will be cleared of vegetation, the construction activities will result in trampling of the vegetation across the entire area covered by the PV panels, along with the additional clearing of trees and shrubs. In addition, the species present on site required full sun and the shading effect will limit seed germination. A transformation of the vegetation underneath and around the solar panels is therefore expected. Even though most of the vegetation is not threatened the cumulative loss may potentially be of High significance, depending on how many projects are approved.

8.7.2.3 Soil compaction and vehicle wheel track entrenchment on site

- Vehicles driven across the site will lead to soil compaction. Plants cannot readily establish in compacted soil, since the soil is too hard for root penetration.
- Rainwater infiltration is less in compacted areas and the runoff is higher.
- Note that new watercourse crossings require a WUL from the DWS.
- It is expected that permanent access routes will cross watercourses. This may result in damage to the watercourses, including changes in flow patterns and erosion.
- The significance of the impact from soil compaction is Low during all phases of the project.

Mitigation:

- 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 and operation areas.
- Do not drive in the natural veld.
- Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible.
- If no vegetation establishment naturally takes place on the abandoned tracks, scouring/ripping of the tracks may be necessary.

8.7.2.4 Erosion and sedimentation on site

- Erosion is likely to occur where vegetation has been cleared.
- Erosion is more likely to occur where watercourses have been damaged or altered.

- Erosion increases the sediment load in the watercourses, resulting in increased sedimentation downstream of the disturbance. Sedimentation may swamp vegetation and alter the characteristics of the watercourse.
- The soil on site is not very erodible. Few signs of erosion are currently visible on site.
- The impact is regional, probable and of moderate consequence.
- The significance of the impact is low before mitigation and very low after mitigation.

Mitigation:

- Monitor the entire site for signs of erosion throughout the construction, operational and decommissioning phases of the project.
- All erosion features must be rehabilitated as soon as possible.
- Implement erosion control measures where necessary.
- Stabilise any bare soil as soon as possible.
- Implement sediment fences around areas with bare soil, especially on slopes.
- The crossing of watercourses must be avoided.
- An appropriate storm water management plan must be implemented on site.
- Storm water may not enter the watercourses directly; it must be attenuated before exiting the storm water system.
- Have an erosion prevention plan and storm water management plans for the site and implement when necessary.
- Adhere to the mitigation measures included above.

Cumulative impact

Applications are being processed for several proposed solar PV plants and power lines in the region. Although the impact on a single PV farm may not be very large, the cumulative impact from soil erosion on all the sites may potentially be of moderate significance, but can be reduced to low with mitigation.

8.7.2.5 Change in flow patterns due to erosion and sedimentation

- As stated above, the panels and various impacts on site may potentially result in erosion and sedimentation on site. This will result in a change in the flow patterns on site.
- The impact is likely to be larger in areas where the vegetation has been removed or altered.
- Due to the fairly dry conditions and low precipitation on site the impact is not expected to extent far downstream.
- The significance of the impact is low before mitigation and very low after mitigation.

Mitigation:

- Adhere to the recommendations included for the Loss of Habitat and Erosion and Sedimentation impacts included above.

Cumulative impact

Applications are being processed for several solar plants and power lines in the region. Although the impact on a single PV farm may not be very big, the cumulative impact from soil erosion on all the sites may potentially be of moderate significance, but can be reduced. This impact is closely linked to the erosion impact and the same mitigation measures apply. The significance of this impact is lowered by the low precipitation in the area.

Mitigation:

- Adhere to the mitigation measures included above.

8.7.2.6 Establishment of alien and invasive species on site

- Alien and invasive species are more likely to establish in disturbed areas than in natural vegetation.
- Vehicles may transport seeds from alien and invasive species into new areas where they were not present before.
- Currently the only invasive species present on site is *Prosopis glandulosa*. This species is most dominant along the watercourses on site, but is also present in disturbed areas.
- Additional invasive species may encroach into the site, but this is fairly unlikely, since few other invasive species were observed in the surroundings.
- It is unlikely that the proposed development will result in additional invasive species spreading from the site, since *Prosopis glandulosa* is already present in the downstream areas and surroundings.
- The significance of the impact appears to be Low before and after mitigation.

Mitigation:

- Compile an alien and invasive species control and monitoring plan as required in the Alien and Invasive Species Regulations under the NEMBA.
- Populations of invasive species on site must be eradicated according to the control plan.
- The spread of invasive and weedy species from the site must be prevented.

Cumulative impact

The site is very similar to the surrounding areas and with the same invasive species present. It is unlikely that additional invasive species will spread from the developments. The significance of the cumulative impact is low.

8.7.2.7 Pollution and littering

Construction and decommissioning phases

- The site camp and construction activities are potential sources of pollution, including hydrocarbons, sewage and domestic waste.
- Pollution may inhibit plant growth and cause water pollution.
- Pollution will mainly be confined to the site, but several pollutants may exit the site via runoff.
- The significance of the impact is low during the construction phase and can be reduced to very low with mitigation measures.

Operational phase

- The most likely type of pollutants generated during the operational phase are hydrocarbons spilled when refuelling vehicles, leakages from poorly maintained vehicles and littering.
- The significance of the impact is very low before and after mitigation.

Mitigation:

- The site camp must be located outside the watercourse area and buffers.
- Dangerous goods may not be stored within 100 m of a watercourse.
- Storage areas must clearly be indicated as such.
- Hydrocarbon fuels must be stored in a secure, bunded area.
- Sufficient rubbish bins must be available on site and clearly marked as such.
- No littering may take place anywhere in the project area.
- Ablution facilities must be located outside the watercourses and their buffer zones.
- Portable ablution facilities must be regularly cleaned and maintained in good working condition.

- Any spillage from ablution facilities must be cleaned up immediately and disposed of in an appropriate manner.
- Vehicles must be in good working condition, with no oil, water or fuel leaks.
- Vehicles must be regularly inspected and any problems corrected.
- Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in any portion of the servitude other than the site camp.
- Any spillages must be reported immediately and dealt with appropriately.
- Spill kits must be available on site in case of accidental spillage.
- Refuelling facilities must be bunded-including the vehicle being refuelled.

8.8 IMPACT ASSESSMENT SUMMARY

Table 8.1: Impact assessment summary table for the Construction Phase.

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibi lity of Impact	Irreplace ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi dence Level
										Without Mitigation/ Manage ment	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing of vegetation	Loss of species of conservation importance	Negative	Site	Permanent	Severe	Likely	Low	High	Avoidance, Search and Rescue	High	Moderate	4	High
Clearing of vegetation	Loss of primary vegetation	Negative	Site	Permanent	Substantial	Highly probable	Low	Moderate	Avoidance of high sensitivity areas	Mderate	Low	4	Mediu m
Clearing of vegetation	Soil compaction and vehicle wheel track entrenchment	Negative	Site	Short term	Moderate	Highly probable	High	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m
Clearing of vegetation, vehicle movement	Erosion and sedimentation	Negative	Local	Medium term	Moderate	Probable	Moderate	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m
Clearing of vegetation, vehicle movement	Change in flow pattern due to erosion and sedimentation	Negative	Local	Medium term	Moderate	Probable	Moderate	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibi lity of Impact	Irreplace ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi dence Level
										Without Mitigation/ Manage ment	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing of vegetation	Establishment of alien and invasive species	Negative	Site	Medium term	Moderate	Highly probable	Moderate	Low	Invasive species monitoring and control plan	Low	Low	4	Mediu m
Movement of vehicles and construction activities	Pollution and littering	Negative	Local	Short term	Moderate	Probable	Moderate	Low	EMP	Low	Very Low	5	Mediu m

Table 8.2: Impact assessment summary table for the Operational Phase.

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibi lity of Impact	Irreplace ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi dence Level
										Without Mitigation/ Manage ment	With Mitigation/ Management (Residual Impact/ Risk)		
Maintenance of cleared areas and additional vegetation clearing	Loss of species of conservation importance	Negative	Site	Permanent	Substantial	Highly probable	Low	High	Avoidance, Search and Rescue	Low	Low	4	High
Maintenance of cleared areas and additional vegetation clearing	Loss of primary vegetation	Negative	Site	Permanent	Moderate	Highly probable	Low	Moderate	Avoidance of high sensitivity areas	Low	Low	4	Medium
Maintenance of cleared areas and additional vegetation clearing	Soil compaction and vehicle wheel track entrenchment	Negative	Site	Short term	Moderate	Highly probable	High	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Medium
Maintenance of cleared areas and additional vegetation clearing	Erosion and sedimentation	Negative	Local	Medium term	Moderate	Probable	Moderate	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Medium

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibi lity of Impact	Irreplace ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi dence Level
										Without Mitigation/ Manage ment	With Mitigation/ Management (Residual Impact/ Risk)		
Maintenance of cleared areas and additional vegetation clearing	Change in flow pattern due to erosion and sedimentation	Negative	Local	Medium term	Moderate	Probable	Moderate	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m
Maintenance of cleared areas and additional vegetation clearing	Establishment of alien and invasive species	Negative	Site	Medium term	Moderate	Highly probable	Moderate	Low	Invasive species monitoring and control plan	Low	Low	4	Mediu m
Movement of vehicles	Pollution and littering	Negative	Local	Short term	Slight	Probable	Moderate	Low	EMP	Very Low	Very Low	5	Mediu m

Table 8.3: Impact assessment summary table for the Decommissioning Phase.

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibi lity of Impact	Irreplace ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi dence Level
										Without Mitigation/ Manage ment	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing of vegetation	Loss of species of conservation importance	Negative	Site	Permanent	Moderate	Highly probable	Low	High	Avoidance, Search and Rescue	Low	Low	4	High
Clearing of vegetation	Loss of primary vegetation	Positive	Site	Permanent	Moderate	Highly probable	Low	Moderate	Avoidance of high sensitivity areas	Low	Low	4	Mediu m
Movement of vehicles	Soil compaction and vehicle wheel track entrenchment	Negative	Site	Short term	Moderate	Highly probable	High	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m
Clearing of vegetation, vehicle movement	Erosion and sedimentation	Positive	Local	Medium term	Moderate	Probable	Moderate	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m
Clearing of vegetation, vehicle movement	Change in flow pattern due to erosion and sedimentation	Positive	Local	Medium term	Moderate	Probable	Moderate	Low	Monitoring and rehabilitation plan	Low	Very Low	4	Mediu m
Clearing of vegetation	Establishment of alien and invasive species	Positive	Site	Medium term	Moderate	Highly probable	Moderate	Low	Invasive species monitoring and control plan	Low	Low	4	Mediu m
Movement of vehicles	Pollution and littering	Negative	Local	Short term	Slight	Probable	Moderate	Low	EMP	Very Low	Very Low	5	Mediu m

Table 4Cumulative impact assessment summary table.

Cumulative Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Consequence	Probability	Reversibi lity of Impact	Irreplace ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi dence Level
										Without Mitigation/ Manage ment	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing of vegetation	Erosion and sedimentation	Negative	Local	Medium term	Substantial	Probable	Moderate	Low	Monitoring and rehabilitation plan	Moderate	Low	4	Mediu m
Clearing of vegetation	Change in flow pattern due to erosion and sedimentation	Negative	Local	Medium term	Substantial	Probable	Moderate	Low	Monitoring and rehabilitation plan	Moderate	Low	4	Mediu m
Clearing of vegetation	Establishment of alien and invasive species	Negative	Site	Medium term	Moderate	Probable	Moderate	Low	Invasive species monitoring and control plan	Low	Low	4	Mediu m
Clearing of vegetation	Loss of primary vegetation	Negative	Site	Permanent	Severe	Definite	Low	Moderate	Avoidance of high sensitivity areas	High	High	3	Mediu m
Clearing of vegetation	Loss of species of conservation importance	Negative	Site	Permanent	Severe	Definite	Low	High	Avoidance, Search and Rescue	High	Moderate	3	High

8.9 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Table 8.12: Input to the EMP.

Aspect / Objective	Action	Activities	Monitoring timing	Responsible person	
Soil management & excavation	Soil excavation	Remove the topsoil from the proposed pylon base locations and solar panel bases and store it temporarily for later use.	Weekly during construction phase	EO / Contractor	
		Store subsoil and topsoil separately.	Weekly during construction phase	EO / Contractor	
		Use the subsoil for shaping during the reinstatement phase and cover with topsoil.	Early rehabilitation phase	EO / Contractor	
	Erosion		Monitor all disturbed areas and new vehicle tracks on site for signs of erosion.	Weekly	EO / Contractor
			Stabilise new erosion features soon as possible.	Weekly	EO / Contractor
			Erect sediment fences adjacent to disturbed areas to prevent sedimentation in the downstream areas. This is especially important where pylons are located in watercourses or watercourse buffers.	Early construction phase	EO / Contractor
			Regularly monitor and clear the sediment fences to ensure they are in good working condition.	Weekly	EO / Contractor
Vegetation clearing	Removal of indigenous vegetation	Only clear the indigenous vegetation where construction activities are to take place.	Early construction phase	EO / Contractor	
		Do not clear vegetation for access or outside the pylon footprint.	Early construction phase	EO / Contractor	
		Seeds can be harvested from indigenous grass species for reseeded and vegetation establishment if necessary.	Early construction phase	EO / Contractor	

Aspect / Objective	Action	Activities	Monitoring timing	Responsible person
	Sensitive habitats	All sensitive habitats must be avoided during placement of the solar farms.	N/A	
		No vegetation clearing may take place within the sensitive habitats.	Every day during site clearing	EO / Contractor
	Threatened and protected species	Search for and collect individuals of <i>Aloe dichotoma</i> and <i>Hoodia gordonii</i> that will be affected by the proposed activities and relocate to suitable habitat..	Before construction	EO / Contractor
		These species may have to be temporarily planted in a nursery. Species must be planted out during the rainy season.	Before construction	EO / Contractor
		Regularly monitor the species for establishment.	Weekly for 2 months	EO / botanist / horticulturist
Access routes	Use of existing routes	Use existing access routes as far as possible.		
		Do not modify the existing access routes without a WUL.		
To protect watercourses on site from vehicle crossing	Restrict vehicle access	Clearly mark the edge of the watercourse buffer zones on site.	Prior to construction	EO
		Erect no-go signs for vehicle movement at the edge of the watercourse buffer zones.	Prior to construction	EO
		Regularly check these areas to ensure that the signage is in place and vehicle crossing are not taking place through the watercourses.	Monthly	EO / construction team
	Watercourse rehabilitation & monitoring	Vehicle tracks must be rehabilitated according to the rehabilitation plan.	As soon as possible after construction	EO
		Monitoring must take place to ensure that tracks are no longer used.	Monthly after rehabilitation	EO
		The site must be monitored until vegetation establishment resemble the surrounding, undisturbed vegetation.	Monthly during the rainy season	EO
To prevent	Control of	Invasive species present on site must be eradicated.		EO

Aspect / Objective	Action	Activities	Monitoring timing	Responsible person
encroachment of invasive plant species into the project servitude	invasive species	Regularly monitor the site for invasive species establishment and control.	Quarterly	EO
		A follow-up survey of alien and invasive species must be conducted by a vegetation specialist or the ECO to determine new infestations by alien and invasive species.	On completion of construction	Botanist / Ecologist
		The alien control plan must be updated on completion of construction to ensure that all species present are targeted.	On completion of construction	Botanist / Ecologist
		Ensure that non-targeted and indigenous species are not included in the eradication programme.	When control take place	EO / contractor
		Ensure that indigenous species that are similar to the invasive species are not included in the eradication programme.	When control take place	EO / contractor
		Do not drive through seeding alien and invasive species, as this will spread the species across the entire site.	Entire project timeframe	All individuals on project
Pollution prevention and control in the wetland area	Site camp and storage of dangerous goods	The site camp must be located outside the watercourse area and buffers.	Prior to construction	EO / contractor
		Dangerous goods may not be stored within 100 m of a watercourse.	Monthly	EO / contractor
		Storage areas must clearly be indicated as such.	Monthly	EO / contractor
		Hydrocarbon fuels must be stored in a secure, bunded area.	Monthly	EO / contractor
		Sufficient rubbish bins must be available on site and clearly marked as such.	Monthly	EO / contractor
		No littering may take place anywhere in the project area.	Monthly	EO / contractor
	Ablution facilities	Sufficient ablution facilities must be available at the site camp and at all areas where construction is taking place.	Monthly	EO / contractor
		Ablution facilities must be located outside the watercourses and their buffer zones.	Monthly	EO / contractor

Aspect / Objective	Action	Activities	Monitoring timing	Responsible person
		Portable ablution facilities must be regularly cleaned and maintained in good working condition.	Monthly	EO / contractor
		Any spillage from ablution facilities must be cleaned up immediately and disposed of in an appropriate manner.	Monthly	EO / contractor
	Spillage off hazardous materials	Vehicles must be in good working condition, with no oil, water or fuel leaks.	Monthly	EO / contractor
		Vehicles must be regularly inspected and any problems corrected.	Monthly	EO / contractor
		Refueling may only take place in an appropriate, bunded area. Refueling may not take place in any portion of the servitude other than the site camp.	Monthly	EO / contractor
		Any spillages must be reported immediately and dealt with appropriately.	Monthly	EO / contractor
		Spill kits must be available on site in case of accidental spillage.	Monthly	EO / contractor

8.10 CONCLUSION AND RECOMMENDATIONS

The vegetation units described in this section include all the vegetation types recorded for the entire study area, including the seven proposed sites for the proposed Boven PV2-PV3, PV4 and Gemsbok PV3-PV4, PV5, and PV6 sites. The species present throughout the different vegetation units are mostly similar, but the dominant species varies. The vegetation units on site cannot be classified into clearly defined vegetation units, but occur along an environmental gradient. The gradients are mostly along substrate and moisture axes. It is however possible to identify three main vegetation units on site, as well as several sub-units. The vegetation types identified on site are listed in Table 8.1 and the potential impacts on site are summarised in Table 8.2 in the Executive Summary. A summary of the vegetation units and their sensitivity on site or in the area is provided in Table 8.13 below.

Table 5 Summary of vegetation units and their sensitivity on site.

Vegetation Unit	Sub-unit	Sensitivity	On site / in area
Short shrubveld (Unit 1)	<i>Salsola aphylla</i> – <i>Stipagrostis uniplumis</i> short shrubveld (Unit 1.1)	Moderate	On site
	<i>Zygophyllum microphyllum</i> – <i>Pteronia mucronata</i> short shrubveld on calcrete (Unit 1.2)	Moderate	In area
Rock outcrops (Unit 2)	<i>Aloe dichotoma</i> – <i>Tetraena retrofracta</i> rock outcrop (Unit 2.1)	High	In area
	<i>Tetraena retrofracta</i> quartz outcrop (Unit 2.2)	Moderate to High	On site
	<i>Salsola aphylla</i> – <i>Stipagrostis obtusa</i> rocky areas (Unit 2.3)	Moderate to High	In area
Watercourses (Unit 3)	<i>Prosopis glandulosa</i> watercourse (Unit 3.1)	Moderate to High	In area
	<i>Rhigozum trichotomum</i> watercourse (Unit 3.2)	High	On site
	<i>Roepera morgsana</i> floodplain (Unit 3.3)	Moderate to High	In area

The species *Aloe dichotoma* and *Hoodia gordonii* were observed on site. *Aloe dichotoma* is a Vulnerable species, which is specially protected under the Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA). The removal or movement of this species will require a permit from Cape Nature. Obtaining a permit for the removal of *Aloe dichotoma* is likely to be problematic. The species will have to be moved to appropriate habitat outside the proposed development area. This will require planning that takes the seasons and rainfall into account.

Hoodia gordonii is a Data Deficient species, but is protected under NEMBA and specially protected under the NCNCA.

In addition, the species *Boscia albitrunca* and *Boscia foetida* were observed on site. *Boscia albitrunca* is a protected species under the National Forestry Act (NFA), as well as the NCNCA, and *Boscia foetida* is protected under the NCNCA.

The sensitivity of the sites and recommendations per site are summarised in Table 14 below. Several mitigation and monitoring measures are recommended in this report and must be adhered too.

Table 8.14: Summary table of site sensitivity.

Site	Alternative	Sensitivity	Total size (ha)	Size (ha)	Size (%)	Recommendations
Boven Solar PV4	Proposed	High	285.99	38.81	13.57	More than 80% of the site falls within a moderate sensitivity area. Development on this site is therefore supported, but the high sensitivity areas must be avoided. This is the preferred alternative.
		Moderate to High		14.30	5.00	
		Moderate		232.88	81.43	
Boven Solar PV3 & PV4	Transmission	High	1 083.94	135.32	12.48	Most of the transmission line falls within a Moderate sensitivity area. Mitigation measures must be adhered to and high sensitivity areas avoided.
		Moderate to High		288.52	26.62	
		Moderate		660.11	60.90	

Development on site can be supported provided that:

- All mitigation measures included in this report are adhered to.
- No development may take place within the High; or Moderate to High conservation importance areas.
- No development may take place within the watercourse buffers.
- All individuals of *Aloe dichotoma* and *Hoodia gordonii* impacted on site must be relocated to sufficient habitat in the area.
- All relevant permits pertaining to the species of conservation importance on site must be obtained before construction commences.
- A WUL is received from the DWS where relevant.

8.11 REFERENCES AND FUTHER READING

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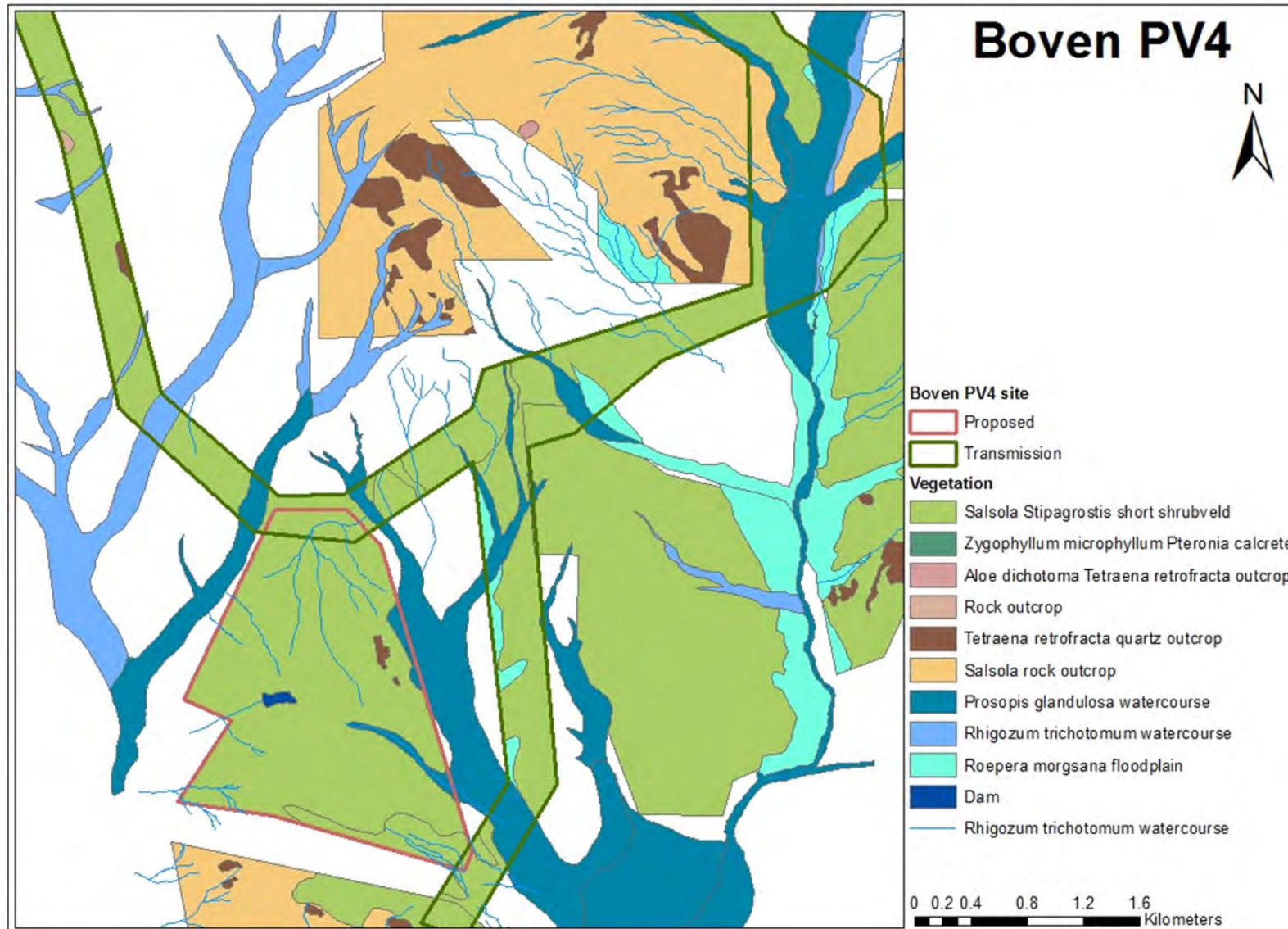
8.12 APPENDICES

Addendum A – Species list

Species	Alien / Invasive species	Threatened / Protected status	Short shrubveld			Rocky outcrops			Watercourses			
			Salsola aphylla-Stipagrostis uniplumis	Excavation	Zygophyllum microphyllum - Pteronia mucronata calcarete	Aloe dichotoma - Tetraena retrofracta	Rock pile	Tetraena retrofracta quartz outcrop	Salsola aphylla rocky area	Prosopis glandulosa	Rhigozum trichotomum	Roepera morgsana floodplain
			1.1		1.2	2.1		2.2	2.3	3.1	3.2	3.3
<i>Salsola aphylla</i>		LC	2a		2b	+		1	2a		+	
<i>Salsola tuberculata</i>		LC	1	+	+							+
<i>Lycium bosciifolium</i>		LC	2a		+	+	+		+		1	+
<i>Felicia hirsuta</i>		LC	1					+	+		+	+
<i>Zygophyllum microphyllum</i>		LC	+		2a							
<i>Pteronia mucronata</i>		LC	+		1			+	+		+	
<i>Tetraena retrofracta</i>			1		+	2a		1	+			
<i>Aptosimum spinescens</i>		LC	1		+	2a		1	+			
<i>Aloe dichotoma</i>		VU / Specially protected NCNCA				1			+		+	
<i>Stipagrostis uniplumis</i>			2a		+	+		2a	+		1	+
<i>Zygophyllum flexuosa</i>			2a			1		2a	1		+	
<i>Enneapogon desvauxii</i>		LC	1	+	+	2a		+	1			
<i>Stipagrostis obtusa</i>		LC	1	+	+	+	2a	+	2a		+	
<i>Rhigozum trichotomum</i>		LC	+	2a	+	+		1	2b		3	3
<i>Ruschia species</i>			+			+		1				
<i>Prosopis glandulosa</i>	Category 3		+							2a		2a
<i>Eragrostis lehmanniana</i>			+						+			1
<i>Roepera morgsana</i>			+	2a	+	+		+	+		+	2a
<i>Acacia mellifera</i>					+					+	+	
<i>Albica sp</i>											+	
<i>Aloe claviflora</i>		LC				+		+				
<i>Anacampseros papyracea</i>		Protected NCNCA						+				
<i>Antheaphora pubescens</i>		LC							+		+	
<i>Atriplex nummularia</i>										+		
<i>Asparagus species</i>								+	+			
<i>Blepharis mitrata</i>		LC	+	+			+		+		+	+
<i>Blepharis species</i>							+					
<i>Boscia albitrunca</i>		Protected NFA / Protected NCNCA	+	+	+	+	+		+			
<i>Boscia foetida</i>		Protected NCNCA				+			+		+	+
<i>Chenopodium sp</i>	Alien		+									
<i>Convolvulus species</i>							+					
<i>Cucumis zeyheri</i>		LC										+
<i>Dianthus micropetalus</i>		LC	+									
<i>Dicoma capensis</i>		LC				+		+				
<i>Eriocephalus species</i>			+		+			+	+		+	+
<i>Felicia species</i>			+			+			+			
<i>Helichrysum species</i>			+			+		+	+			

Species	Alien / Invasive species	Threatened / Protected status	Short shrubveld			Rocky outcrops			Watercourses			
			Salsola aphylla-Stipagrostis uniplumis	Excavation	Zygophyllum microphyllum - Pteronia mucronata calcarete	Aloe dichotoma - Tetraena retrofracta	Rock pile	Tetraena retrofracta quartz outcrop	Salsola aphylla rocky area	Prosopis glandulosa	Rhigozum trichotomum	Roepera morgsana floodplain
			1.1		1.2	2.1		2.2	2.3	3.1	3.2	3.3
<i>Hoodia gordonii</i>		DDD / Protected NEMBA, Specially protected NCNCA				+						
<i>Justicia cuneata</i>			+									
<i>Kleinia longiflora</i>		LC		+		+		+	+			
<i>Larrylaechia marlothii</i>					+							
<i>Melolobium candicans</i>		LC							+			
<i>Mesembryanthemum spec.</i>				+								
<i>Mesembryanthemum subnodosum</i>					+	+		+	+	+		
<i>Mesembryanthemum guerichianum</i>		LC								+		
<i>Monsonia salmonifolia</i>						+		+				
<i>Pentzia sp</i>			+		+							
<i>Pereskia sacharosa</i>			+									
<i>Psilocaulon articulatum</i>		LC	+					+	+			
<i>Pteronia erythrochaeta</i>		LC	+		+				+		+	
<i>Pteronia species</i>					+							
<i>Schinus molle</i>	Alien									+		
<i>Sisyndite sparteae</i>		LC							+			
<i>Solanum tomentosum</i>							+					
<i>Stipagrostis ciliata</i>								+			+	
<i>Stipagrostis namaquensis</i>		LC								+	+	
<i>Tapinanthus sp</i>												+
<i>Thesium lineatum</i>		LC		+	+	+	+	+	+			

Addendum B – Vegetation map of the site for the proposed Boven Solar PV4 facility site



CHAPTER 8 – VEGETATION ASSESSMENT

Addendum C – Sensitivity map for the proposed Boven Solar PV4 facility site

