



Scatec Solar  
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# EIA REPORT



## **Scoping and Environmental Impact Assessment**

for the Proposed Development of a  
75 MW Solar Photovoltaic Facility  
(KENHARDT PV 1) on the remaining  
extent of Onder Rugzeer Farm 168,  
north-east of Kenhardt, Northern  
Cape Province

*Prepared for:*  
Scatec Solar SA 330 (PTY) Ltd

CSIR Report No.: CSIR/CAS/EMS/ER/2015/0007/B

April 2016

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Scoping and Environmental Impact Assessment for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province:

## **EIA REPORT**

CSIR Report Number: CSIR/CAS/EMS/ER/2015/0007/B

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*Prepared for:*

Scatec Solar SA 330 (PTY) Ltd

*Prepared by:*

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# report details

Title:	<b>Scoping and Environmental Impact Assessment for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province: EIA REPORT</b>
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 Kenhardt PV 1 project. In accordance with the 2014 NEMA EIA Regulations, the purpose of the EIA Report is to:</p> <ul style="list-style-type: none"> <li>• Present the details of and need for the proposed project;</li> <li>• Describe the affected environment, including the planning context, at a sufficient level of detail to facilitate informed decision making;</li> <li>• Provide an overview of the EIA Process being followed, including public consultation;</li> <li>• Assess the predicted positive and negative impacts of the project on the environment;</li> <li>• Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project;</li> <li>• Provide an Environmental Management Programme (EMPr) for the design, construction and operational phases of the project.</li> </ul> <p>The EIA Report was made available to all stakeholders for a 30-day review period extending from 3 March 2016 to 5 April 2016. All comments on the EIA Report (submitted within the 30-day review period) have been considered in the preparation of this finalised EIA Report. This finalised EIA Report has been 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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## Key Changes from the EIA Report that was issued for Public Review

Chapter 1	<ul style="list-style-type: none"> <li>▪ Updated Section 1 with additional information regarding the submission of the Amended Application for Environmental Authorisation to the DEA, as well as DEA's acknowledgment of receipt of the EIA and Basic Assessment Reports, as well as the assignment of reference numbers for the Basic Assessment projects.</li> <li>▪ Table 1.1 has been updated based on feedback from I&amp;APs in terms of the need and desirability.</li> <li>▪ Updated Section 1.3 with additional information regarding the submission of the Amended Application for Environmental Authorisation to the DEA.</li> <li>▪ Updated Section 1.4 with additional information regarding the TIS.</li> <li>▪ Updated Section 1.6 in terms of the progress made regarding the EIA Process.</li> </ul>
Chapter 2	<ul style="list-style-type: none"> <li>▪ Updated Section 2.3 with additional information regarding the status of the Basic Assessment Projects.</li> <li>▪ Updated Section 2.3.2.2 with additional information regarding the widening and upgrading of the existing farm road leading to the site.</li> <li>▪ Updated Section 2.3.2.5 with additional information regarding the status of feedback from the municipality.</li> </ul>
Chapter 4	<ul style="list-style-type: none"> <li>▪ Updated Section 4.1 with additional information regarding the release of the EIA Report for comment.</li> <li>▪ Updated Section 4.2 with information regarding the Amended Application for Environmental Authorisation, the listed activities that are and are no longer applicable based on the design progression and additional confirmation, and DEA's acknowledgment of receipt of the Basic Assessment Reports, as well as the assignment of reference numbers for the Basic Assessment projects.</li> <li>▪ Updated Section 4.3.1.4 with a description of feedback received from the South African Heritage Resources Agency (SAHRA).</li> <li>▪ Updated Section 4.3.1.6 with the status of feedback from the Department of Agriculture, Forestry and Fisheries (DAFF).</li> <li>▪ Updated Section 4.3.1.7 with a description of consultation with the Department of Water and Sanitation (DWS).</li> <li>▪ Updated Section 4.3.1.8 and Section 4.9.8 with a description of feedback received from the Square Kilometre Array (SKA).</li> <li>▪ Updated Section 4.3.2.1 with a description of consultation with the Northern Cape Department of Environment and Nature Conservation.</li> <li>▪ Updated Section 4.5 and Section 4.10 with details of the Public Participation Process undertaken thus far, and updated the project schedule.</li> <li>▪ Updated Table 4.6 with the status of the projects being considered in the assessment of cumulative impacts.</li> </ul>
Chapter 6	<ul style="list-style-type: none"> <li>▪ Section 6.1 has been updated with the Public Participation Process undertaken thus far.</li> <li>▪ Responses provided in Section 6.2 and Section 6.3 have been updated, where applicable.</li> <li>▪ Section 6.4 is new and has been added to include comments received during the review of the EIA Report.</li> </ul>
Chapter 16	<ul style="list-style-type: none"> <li>▪ Section 16.1 has been updated with the Public Participation Process undertaken thus far.</li> <li>▪ Updated Section 16.1.9 and 16.6.6 with a description of feedback received from the SKA, as well as the follow up response to the SKA in terms of commitment to the implementation of mitigation measures).</li> <li>▪ Section 16.5 has been updated with additional information regarding the widening and upgrading of the existing farm road leading to the site, as well as feedback from the SAHRA in terms of buffer zones.</li> </ul>
Appendix C	<ul style="list-style-type: none"> <li>▪ Updated the database of I&amp;APs to reflect stages of consultation, commenting, as well as additions to the database.</li> </ul>
Appendix D	<ul style="list-style-type: none"> <li>▪ Updated with additional newspaper advertisement and proof of placement for the release of the EIA Report.</li> </ul>
Appendix E	<ul style="list-style-type: none"> <li>▪ Updated with correspondence sent and proof of correspondence to I&amp;APs for the release of the EIA Report.</li> <li>▪ Updated with the additional response and follow up correspondence sent to I&amp;APs.</li> </ul>
Appendix G	<ul style="list-style-type: none"> <li>▪ Updated to include additional correspondence received from I&amp;APs during the review of the EIA Report.</li> </ul>
Appendix H	<ul style="list-style-type: none"> <li>▪ Included updated Application for EA.</li> </ul>
Appendix I	<ul style="list-style-type: none"> <li>▪ Provided a copy of the DEA letter of acknowledgment for the EIA Report for comment (Appendix I.5).</li> </ul>

**Note from the CSIR:** If sections are not mentioned in the above table (i.e. Chapters 3, 5, 7 to 15, and Chapter 17, and Appendices A, B, F, and K), this means that there have been no major changes to these sections (for example, in Chapter 5 and Chapters 7 to 13, the main change or update was the status of the separate Basic Assessment projects).

## DEA INFORMATION REQUIREMENTS

General Site Information	Reference in the EIA Report
Description of all affected farm portions	Chapters 2, 3 and 5 (as well as Specialist Studies in Chapters 7 to 14).
21 digit Surveyor General codes of all affected farm portions	C03600000000016800000
Copies of title deeds of all affected land portions	Appendix J
Photos of areas that give a visual perspective of all parts of the site	Chapter 8
Photos from sensitive visual receptors (tourism routes, tourism facilities, etc.)	Chapter 8
Solar plant design specifications including: <ul style="list-style-type: none"> <li>Type of technology</li> <li>Structure height</li> <li>Surface area to be covered (including associated infrastructure such as roads)</li> <li>Structure orientation</li> <li>Laydown area dimensions (construction period and thereafter)</li> <li>Generation capacity</li> </ul>	Chapter 2
Generation capacity of the facility as a whole at delivery points	75 MW AC, 100 MW DC
Site Maps and GIS information	Reference in the EIA Report
All maps/information layers must also be provided in ESRI Shapefile format	Included on Compact Disk (CD) submitted to the DEA with this EIA Report.
All affected farm portions must be indicated	Included on CD submitted to the DEA with this EIA Report.
The exact site of the application must be indicated (the areas that will be occupied by the application)	Chapter 16 and Appendix J
A status quo map/layer must be provided that includes the following: <ul style="list-style-type: none"> <li>Current use of land on site including: <ul style="list-style-type: none"> <li>Buildings and other structures</li> <li>Agricultural Fields</li> <li>Grazing Areas</li> <li>Natural Vegetation Areas</li> <li>Critical endangered and endangered vegetation areas that occur on the site</li> <li>Bare areas which may be susceptible to soil erosion</li> <li>Cultural historical sites and elements</li> </ul> </li> <li>Rivers, streams and watercourses</li> <li>Ridgelines and 20 m continuous contours with height references in the GIS database</li> <li>Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs</li> <li>High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries</li> <li>Buffer zones</li> <li>Indicated isolated residential, tourism facilities on or within 1 km of the site</li> </ul>	Included on CD submitted to the DEA with this report and discussed in Chapters 2, 3 and 5 and Chapters 7 to 14 of this EIA Report, as applicable.
A slope analysis map/layer	Included on CD submitted to the DEA with this EIA Report
A site development proposal map(s)/layer(s) that indicate: <ul style="list-style-type: none"> <li>Foundation footprint</li> <li>Permanent laydown area footprint</li> <li>Construction period laydown footprint</li> <li>Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve</li> <li>River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used</li> </ul>	Chapter 2, Chapter 16 and Appendix J

<ul style="list-style-type: none"> <li>• Substations and/or transformers sites including their entire footprint</li> <li>• Cable routes and trench dimensions (where they are not along internal roads)</li> <li>• Connection routes to the distribution/transmission network</li> <li>• Cut and fill areas along roads and at substations/transformer sites indicating the expected volume of each cut and fill</li> <li>• Borrow pits</li> <li>• Spoil heaps (temporary for topsoil and subsoil and permanently for excess material)</li> <li>• Buildings including accommodation</li> </ul>	
<b>Regional map and GIS information</b>	<b>Reference in the EIA Report</b>
All maps/information must also be provided in ESRI Shapefile format	Noted
The map/layer must cover an area of 20 km around the site	Noted
Roads including their types (tarred or gravel) and category (national, provincial, local or private)	Included on CD submitted to the DEA with this report and discussed in Chapter 14 of this EIA Report
Railway lines and stations	Included on CD submitted to the DEA with this report and shown in maps in this EIA Report where applicable.
Industrial areas	N/A
Harbours and airports	N/A
Electricity transmission and distribution lines and substations	Included on CD submitted to the DEA with this EIA Report
Pipelines	Chapter 16 of this EIA Report
Water sources to be utilised during the construction and operational phases	Discussed in Chapter 2 of this EIA Report
A visibility assessment of the areas from where the facility will be visible	Chapter 8 of this EIA Report
Critical Biodiversity Areas and Ecological Support Areas	N/A
Critically Endangered and Endangered Vegetation areas	N/A
Agricultural fields	N/A
Irrigated areas	N/A
An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams	Chapter 16 and Appendix J of this EIA Report



# executive summary

## PROJECT OVERVIEW

Scatec Solar SA 163 (PTY) Ltd is proposing to develop three 75 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (including 132 kV transmission lines for each 75 MW facility) on the remaining extent of Onder Rugzeer Farm 168 and the connection lines points to the Eskom Nieuwehoop Substation on the remaining extent of Portion 3 of Gembok Bult Farm 120, approximately 80 km south of Upington and 20-30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province. Scatec Solar SA 163 (PTY) Ltd consists of various subsidiary companies, one of which is Scatec Solar SA 330 (PTY) Ltd. Scatec Solar SA 330 (PTY) Ltd (hereinafter referred to as Scatec Solar) is the Project Applicant for this proposed 75 MW solar PV project (referred to as Kenhardt PV 1).

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 three Solar PV facilities. A separate Basic Assessment Process has been undertaken for the development of the proposed transmission lines, associated electrical infrastructure and connection to the Eskom Nieuwehoop Substation. The Applicant has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the separate EIA and Basic Assessment Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activity.

Since the proposed 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) has been undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) have been lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Scoping and EIA project, as well as for each Basic Assessment project. Furthermore, separate reports (i.e. Basic Assessment, Scoping and EIA Reports) have been compiled for each project.

The abovementioned integrated PPP approach, as well as the general approach to the Scoping and EIA Projects and the Basic Assessment Projects, were discussed with and approved by the DEA at a pre-application meeting, which was held on 17 September 2015. Appendix I.1 of this finalised 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.

The proposed 75 MW Solar PV facility projects (requiring a Scoping and EIA Process) are referred to as (together with the corresponding assigned DEA Reference Numbers):

- Kenhardt PV 1 - DEA Reference: 14/12/16/3/3/2/837;
- Kenhardt PV 2 - DEA Reference: 14/12/16/3/3/2/838; and
- Kenhardt PV 3 - DEA Reference: 14/12/16/3/3/2/836.

The proposed 132 kV transmission line projects (requiring a Basic Assessment Process) are referred to as (together with the corresponding assigned DEA Reference Numbers):

- Kenhardt PV 1 - Transmission Line - DEA EIA Reference: 14/12/16/3/3/1/1547;
- Kenhardt PV 2 - Transmission Line - DEA EIA Reference: 14/12/16/3/3/1/1546; and
- Kenhardt PV 3 - Transmission Line - DEA EIA Reference: 14/12/16/3/3/1/1545.

This EIA Report only discusses the proposed **Kenhardt PV 1** project.

## 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 projects aim to contribute to the above strategic imperative.

## PROJECT APPLICANT

Scatec Solar is an integrated IPP that is focused on making solar energy a sustainable and affordable source on a global scale. Scatec Solar was founded in 2001 and holds its headquarters in Norway. The company develops, builds, owns and operates a number of solar power plants internationally and within Africa. The company is growing significantly and is currently planned to provide a combined 207 MW of power in the United States, Honduras and Jordan. In addition, Scatec Solar collectively delivers more than 219 MW of power in the Czech Republic, South Africa and Rwanda. Specifically linked to investment within South Africa, Scatec Solar has been involved in the following major solar energy projects:

- The Linde Solar Plant (40 MW) is located in the Northern Cape and is considered to be the first of the large-scale PV plants in production from the second round of the REIPPPP.
- The Dreunberg Solar Plant (75 MW) is the only REIPPPP Solar PV Project to be located in the Eastern Cape.
- The Kalkbult Solar Plant (75 MW) is located in the Northern Cape and was the first REIPPPP project to be connected to the grid and operational in South Africa.

Scatec Solar was awarded another further 258 MW in the Fourth Round of the REIPPPP.

## PROJECT EIA TEAM

As mentioned above, the CSIR has been appointed to undertake the separate EIA and Basic Assessment Processes. The EIA project team, including the relevant specialists are indicated in the table below:

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
<b>Environmental Assessment Practitioners</b>		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Surina Laurie	CSIR	Project Leader ( <i>Pr. Sci. Nat.</i> )
Rohaida Abed	CSIR	Project Manager ( <i>Pr. Sci. Nat.</i> )
<b>Specialists</b>		
Simon Bundy	Sustainable Development Projects cc	Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna)
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
Julian Conrad	GEOSS	Geohydrological Assessment
Johann Lanz	Private	Soils and Agricultural Potential Assessment
Rudolph du Toit	CSIR	Social Impact Assessment
P. S. van der Merwe and A. J. Otto	MESA Solutions (PTY) Ltd	Electromagnetic Interference and Radio Frequency Interference Surveys

It must be reiterated that the Social Impact Assessment specialist study (included in Chapter 13 of the finalised EIA Report) was subject to a peer review process by an external reviewer (Ms. Liza van der Merwe, a private consultant), as requested by the DEA. This external review report is included as an appendix to the Social Impact Assessment.

A Traffic Impact Statement was also compiled by the Environmental Assessment Practitioner (EAP) and is included in Chapter 14 of the EIA Report, however it serves as a general description of the existing and predicted traffic associated with the proposed project and does not classify as a specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations. Furthermore, this statement considered the full development (i.e. the development of the three Solar PV Facilities (i.e. Kenhardt PV 1, 2 and 3) and the associated electrical infrastructure (which are the subjects of separate BA Processes).

In addition, an Electro Magnetic Interference and Radio Frequency Interference Survey Technical Study was commissioned by the Project Applicant to determine the impact of the proposed project on the SKA, as requested by the SKA Project Office. This report is also not a standard specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations.

## PROJECT DESCRIPTION

It is important to point out at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of an EA, should one be granted for the proposed project).

Linked to enhancing its operations within South Africa, the 75 MW Solar PV facility (i.e. Kenhardt PV 1) proposed by Scatec Solar will cover an approximate area of 250 hectares (ha). The preferred site for the proposed PV facility was assessed in this EIA Phase, which covers an area of

approximately 450 ha. The approximate centre point coordinates for this site is 29° 11' 17.73"S and 21° 17' 45.82"E.

This 450 ha area was assessed by the specialists and considered in the EIA, even though the proposed project only requires 250 ha of land (this excludes the access roads leading to the site). This approach was undertaken in order to avoid environmental constraints and sensitivities (highlighted by the specialists), during the siting and final design of the facility. The proposed project site does not fall within a Critical Biodiversity Area (CBA), Ecological Support Area (ESA) or threatened ecosystem.

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 100 MW Direct Current (DC) which produces 75 MW Alternating Current (AC) of electricity from PV solar energy.

Once a Power Purchase Agreement (PPA) is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The proposed solar facility will consist of the following components:

- Solar Field:
  - Solar Arrays:
    - PV Modules;
    - Tracking structures;
    - Solar module mounting structures comprised of galvanised steel and aluminium; and
    - Foundations which will likely be drilled and concreted into the ground.
- Building Infrastructure:
  - Offices;
  - Operational and maintenance control centre;
  - Warehouse/workshop;
  - Ablution facilities;
  - Converter/Inverter stations;
  - On-site substation building; and
  - Guard Houses.
- Associated Infrastructure
  - 132 kV overhead transmission line (this has been assessed as part of a separate Basic Assessment Process, referred to as Kenhardt PV 1 - Transmission Line);
  - Associated electrical infrastructure at the Eskom Nieuwehoop Substation (including but not limited to feeders, Busbars, transformer bay and extension to the platform at the Eskom Nieuwehoop Substation) (as mentioned above this has been assessed as part of a separate Basic Assessment Process, referred to as Kenhardt PV 1 - Transmission Line);
  - On-site substation;
  - Internal transmission lines/underground cables;
  - Underground low voltage cables or cable trays;
  - Access roads;
  - Internal gravel roads;
  - Fencing;
  - Panel maintenance and cleaning area;
  - Stormwater channels; and
  - Temporary work area during the construction phase (i.e. laydown area).

## NEED 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 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”.*

Chapter 4 of this finalised EIA Report contains the detailed list of activities contained in R983, R984 and R985 which are triggered by the various project components and thus form part of this Scoping and EIA Process.

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, Scatec Solar, 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 EIA PROCESS

The original Applications for EA for the Scoping and EIA Projects were submitted to the DEA via courier on 30 September 2015, together with the Scoping Reports for comment. Appendix E of this finalised EIA Report includes the proof of submission (i.e. courier waybills) of the original Applications for EA and the Scoping Reports to the DEA. The DEA acknowledged receipt of the Scoping Reports and original Applications for EA on 26 October 2015 via email (as included in Appendix I.2 of this finalised EIA Report). DEA EIA Reference Numbers were assigned to each Scoping and EIA Project, as noted above.

It is important to note that based on the design progression, certain listed activities as included in the original Application for EA are no longer triggered and two additional listed activities have become applicable (thus triggered) since the submission of the original Application for EA. An amended Application for EA has therefore been submitted to the DEA for decision-making together with this finalised EIA Report. Additional information regarding the amended Application for EA is included in Chapter 4 of this finalised EIA Report.

The Applications for EA for the Basic Assessment projects were submitted to the DEA in March 2016 together with the Basic Assessment and EIA Reports for comment. The DEA acknowledged receipt of the Basic Assessment Reports and Applications for EA on 1 April 2016 via email (as shown in the separate appendices to the Basic Assessment Reports). The DEA Reference Numbers for the Basic Assessment Projects were accordingly provided as noted above.

The Scoping Reports were made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 25 September 2015 to 27 October 2015. The Addendum to the Scoping Report was released to I&APs for a further 30-day comment period

extending from 6 October 2015 to 5 November 2015. The addendum included additional information that was requested by the DEA relating to an assessment of alternatives in the Scoping Phase.

The comments received from stakeholders during the 30-day review of both the Scoping Report and Addendum were incorporated into the Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA in November 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 8 December 2015, which enabled the commencement of the impact assessment phase.

The EIA Report was released to stakeholders for a 30-day review period (together with the Basic Assessment Reports), extending from 3 March 2016 to 5 April 2016. The EIA Report was made available in the Kenhardt and Groblershoop public libraries. An electronic version of the EIA Report was also available on the following project website: <http://www.csir.co.za/eia/ScatecSolarPV/>. Written notifications, hard copies and/or CDs containing the document were sent to key stakeholders, including authorities, to inform them of the release of the EIA Report for the 30-day comment period. All comments received have been included in the finalised EIA Report, for submission to the DEA for decision-making.

The results of the specialist studies and other relevant project information are summarised and integrated into this finalised EIA Report. Part B of this finalised 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.

## IMPACT ASSESSMENT AND MANAGEMENT ACTIONS

This section provides a summary of the main impacts identified and assessed by the specialists in the EIA Report. The significant impacts and corresponding impact significance ratings before and after mitigation and the key associated mitigation and management measures are summarised in this section.

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
<p>Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna)</p>	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>Ousting (and recruitment) of various fauna.</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>Ousting (and recruitment) of various fauna on account of long term changes in the surrounding habitat/environment.</li> <li>Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities.</li> </ul> <p><b>Decommissioning Phase:</b></p> <ul style="list-style-type: none"> <li>Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures.</li> </ul>	<p><b>Pre-Construction and Construction Phases:</b></p> <ul style="list-style-type: none"> <li>Carry out a second assessment of the site in or around February to March (subsequent to the issuing of an EA and the completion of the detailed engineering) in order to identify any additional plant specimens of significance that may be evident on site. Such specimens may be relocated/removed or avoided (with the relevant permits and approvals in place) prior to the commencement of construction.</li> <li>An initial pre-construction clearance of all exotic vegetation on site should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic weed control measures should be implemented during the construction phase and may be incorporated into an exotic weed control plan for the site.</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>Provision of critter paths within the fencing should be considered in the design.</li> <li>Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the electric fence (i.e. tortoise).</li> <li>Adopt “dry” cleaning methods, such as dusting and sweeping the site before washing down.</li> </ul> <p><b>Decommissioning Phase:</b></p> <ul style="list-style-type: none"> <li>Conduct monitoring of the land conditions and redress of exotic weeds found present on site.</li> </ul>	<p>Negative: Moderate-Very Low</p>	<p>Negative: Very Low-Low</p>

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
Visual Impact Assessment	<p><b><u>Construction, Operational and Decommissioning Phases:</u></b></p> <ul style="list-style-type: none"> <li>▪ Potential visual intrusion of construction, operational and decommissioning activities on existing views of sensitive visual receptors.</li> </ul> <p><b><u>Operational Phase:</u></b></p> <ul style="list-style-type: none"> <li>▪ Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors; and</li> <li>▪ Potential impact of night lighting of a large solar energy facility on the nightscape of the region.</li> </ul>	<p><b><u>Construction Phase:</u></b></p> <ul style="list-style-type: none"> <li>▪ 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.</li> </ul> <p><b><u>Operational Phase:</u></b></p> <ul style="list-style-type: none"> <li>▪ The project developer should maintain re-vegetated 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.</li> <li>▪ A lighting plan that documents the design, layout and technology used for lighting purposes should be prepared, indicating how nightscape impacts will be minimised.</li> </ul> <p><b><u>Decommissioning Phase:</u></b></p> <ul style="list-style-type: none"> <li>▪ Disturbed and transformed areas should be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes.</li> </ul>	Neutral: Moderate-Very Low	Neutral: Low-Very Low
Heritage Impact Assessment (Archaeology and Cultural Landscape)	<p><b><u>Construction Phase</u></b></p> <ul style="list-style-type: none"> <li>▪ Damage to or destruction of archaeological resources and graves.</li> </ul> <p><b><u>Construction, Operational and Decommissioning Phases</u></b></p> <ul style="list-style-type: none"> <li>▪ Impacts to the cultural and natural landscape.</li> </ul>	<p><b><u>Construction Phase:</u></b></p> <ul style="list-style-type: none"> <li>▪ The construction team should be informed of the possibility of encountering graves and should be encouraged to report any suspicious-looking stone features prior to disturbance;</li> <li>▪ The potential grave should be avoided with a buffer of at least 5 m or else tested and, if necessary, exhumed prior to construction;</li> <li>▪ The built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and</li> </ul>	Negative: High-Very Low	Negative: Low-Very Low



Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
		<ul style="list-style-type: none"> <li>If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.</li> </ul>		
Desktop Palaeontological Impact Assessment	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul>	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>All substantial bedrock excavations (into sedimentary rocks) should be monitored for fossil material by the responsible ECO. Should significant fossil remains be exposed during construction, the responsible ECO should safeguard these, preferably <i>in situ</i>. The SAHRA should be alerted as soon as possible, so that appropriate action can be taken by a professional palaeontologist.</li> <li>Appoint a professional palaeontologist to record and sample any chance fossil finds. The palaeontologist concerned with mitigation work will need a valid fossil collection permit from SAHRA.</li> </ul>	Negative: Very Low	Negative: Very Low
Geohydrological Assessment	<p><b>Construction and Operational Phases:</b></p> <ul style="list-style-type: none"> <li>Potential impact of increased storm water outflows.</li> </ul> <p><b>Construction, Operational and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>Potential impact on groundwater quality as a result of accidental oil spillages and fuel leakages.</li> </ul>	<p><b>Construction, Operational and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>All reasonable measures must be taken to prevent soil, storm water outflows and groundwater contamination.</li> <li>Emergency measures and plans must be put in place and rehearsed in order to prepare for accidental spillage.</li> <li>Vehicle and washing areas must also be on paved surfaces and the by-products correctly managed.</li> <li>If spillages occur, they should be contained and</li> </ul>	Neutral: Very Low	Neutral: Very Low

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
		removed as rapidly as possible, with correct disposal procedures of the spilled material. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.		
Soils and Agricultural Potential Assessment	<p><b>Construction and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>Degradation of veld vegetation beyond the direct footprint of the proposed PV facility.</li> <li>Loss of topsoil due to poor topsoil management.</li> <li>Loss of agricultural land use.</li> <li>Soil erosion by wind or water due to alteration of the land surface characteristics.</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>Loss of agricultural land use.</li> <li>Soil erosion by wind or water due to alteration of the land surface characteristics.</li> </ul>	<p><b>Construction, Operational and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>Implement an effective system of stormwater run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.</li> </ul>	Negative: Very Low-Low	Negative: Very Low
	<p><b>Construction, Operational and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>Generation of additional land use income through the rental of the land for the proposed solar energy facility.</li> </ul>	None	Positive: Very Low	Positive: Very Low
Social Impact Assessment	<p><b>Construction and Operational Phases:</b></p> <ul style="list-style-type: none"> <li>Negative Impact: Influx of jobseekers</li> <li>Negative Impact: Increases in social deviance and increases in incidence of HIV/AIDS infections</li> <li>Negative Impact: Expectations regarding jobs</li> </ul>	<p><b>Construction and Operational Phases:</b></p> <ul style="list-style-type: none"> <li>Develop and implement a Workforce Recruitment Plan;</li> <li>Clearly define and agree upon the Project Affected People (PAP);</li> <li>Develop a database of PAP and their relevant skills and experience, or use an existing legitimate database of skills and expertise;</li> <li>Develop and implement a Stakeholder Engagement Plan; and</li> <li>Delivery on the Economic Development Plan must be contractually binding on the proponent.</li> </ul>	Negative: Moderate-Low	Negative: Low-Very Low
	<p><b>Construction and Operational Phases:</b></p> <ul style="list-style-type: none"> <li>Positive Impact: Local spending</li> <li>Positive Impact: Local employment</li> <li>Positive Impact: Human development resulting from the</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Workforce Recruitment Plan;</li> <li>Procure goods and services, where practical, within the study area;</li> </ul>	Positive: Moderate-Low	Positive: Moderate-Low

Specialist Study	Main Impacts	Main Mitigation Measures	Overall Impact Significance Before Mitigation or Enhancement	Overall Impact Significance After Mitigation or Enhancement
	proposed Economic Development Plan	<ul style="list-style-type: none"> <li>The proponent should engage with local NGOs, CBOs and local government structures in the Kenhardt community to identify and agree upon relevant skills and competencies required;</li> <li>Such skills and competencies should then be included in the Economic Development Plan; and</li> <li>Where possible, align the Economic Development Plan with Local Municipality's IDP.</li> </ul>		
Traffic Impact Statement	<p><b>Construction, Operation and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>Increase in traffic generation.</li> <li>Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.</li> <li>Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment.</li> <li>Decrease in quality of surface condition of the roads.</li> </ul>	<p><b>Construction, Operational and Decommissioning Phases:</b></p> <ul style="list-style-type: none"> <li>Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the Provincial Government Northern Cape (PGNC) Department of Public Works, Roads and Transport.</li> <li>A Road Maintenance Plan should be developed for the section of the Transnet Service Road.</li> </ul>	Negative: High-Low	Negative: Moderate- Low
Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) Survey Technical Study	Note from the CSIR this study was commissioned by the Project Applicant to determine the impact of the proposed project on the Square Kilometre Array (SKA), as requested by the SKA Project Office. This report is not a standard specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations, as it is a detailed, technical report which provides a cumulative topographical analysis of the proposed PV projects in the Astronomy Geographic Advantage Area and was undertaken to determine appropriate mitigation and management measures to reduce the risk of a detrimental impact on the SKA project.	<ul style="list-style-type: none"> <li>The inverter units, transformers, communication and control units for an array of panels all be housed in a single shielded environment.</li> <li>For shielding of such an environment ensure RFI gasketting be placed on all seams and doors and RFI Honeycomb filtering be placed on all ventilation openings.</li> <li>Cables to be laid directly in soil or properly grounded cable trays (not plastic sleeves).</li> <li>The use of bare copper directly in soil for earthing is recommended.</li> <li>Assuming a tracking PV plant design, care will have to be taken to shield the noise associated with the relays, contactors and hydraulic pumps of the tracking units.</li> <li>All data communications to and from the plant to be via fibre optic.</li> </ul>	Refer to Technical Report in Appendix K of the EIA Report	Refer to Technical Report in Appendix K of the EIA Report

## OVERALL EVALUATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Based on the findings of the specialist studies, which all recommend that the proposed project can proceed and should be authorised by the DEA, the proposed project is considered to have an overall low negative environmental impact and an overall moderate positive socio-economic impact (with the implementation of respective mitigation and enhancement measures).

The proposed project will take place within the Development Envelope. The location of the 250 ha PV facility within the assessed Development Envelope will avoid the sensitive ecological and heritage features identified by the respective specialists. An indicative Site Development Plan within the Development Envelope has been produced and included within this report.

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

The outcomes of this project therefore succeeds in meeting the environmental management objectives of protecting the ecologically sensitive areas and supporting sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site. The findings of this EIA show that all natural resources will be used in a sustainable manner (i.e. this project is a renewable energy project and the majority of the negative site specific and cumulative environmental impacts are considered to be of low significance with mitigation measures implemented), while the benefits from the project will promote justifiable economic and social development.

Taking into consideration the findings of the EIA Process and given the national and provincial strategic requirements for infrastructure development, 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 project receive EA in terms of the 2014 EIA Regulations promulgated under the NEMA.

# 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
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
ICB	Iron Chromium Battery
IDP	Integrated Development Plan
IPP	Independent Power Producer
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
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
SARERD	South African Renewable Energy Resource Database
SDF	Spatial Development Framework
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



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# EIA REPORT



## PART A

### EIA Report

#### **Scoping and Environmental Impact Assessment**

for the Proposed Development of a  
75 MW Solar Photovoltaic Facility  
(KENHARDT PV 1) on the remaining  
extent of Onder Rugzeer Farm 168,  
north-east of Kenhardt, Northern  
Cape Province

# EIA REPORT



## CHAPTER 1: Introduction

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province



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## 1. INTRODUCTION

Scatec Solar SA 163 (PTY) Ltd is proposing to develop three 75 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (including 132 kV transmission lines for each 75 MW facility) on the remaining extent of Onder Rugzeer Farm 168 and the connection points to the Eskom Nieuwehoop Substation on the remaining extent of Portion 3 of Gembok Bult Farm 120. These projects are proposed approximately 80 km south of Upington and 20-30 km north-east of Kenhardt within the !Kheis Local Municipality, Northern Cape Province. Scatec Solar SA 163 (PTY) Ltd consists of various subsidiary companies, one of which is Scatec Solar SA 330 (PTY) Ltd. Scatec Solar SA 330 (PTY) Ltd (hereinafter referred to as Scatec Solar) is the Project Applicant for this proposed 75 MW solar PV project (referred to as Kenhardt PV 1).



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 three Solar PV facilities. A separate Basic Assessment Process has been undertaken for the development of the proposed transmission lines and connection to the Eskom Nieuwehoop Substation. The Applicant has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the separate EIA and Basic Assessment Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed activity.

Since the proposed 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) has been undertaken for the proposed projects. However, separate Applications for Environmental Authorisation (EA) have been lodged with the Competent Authority (i.e. the National Department of Environmental Affairs (DEA)) for each proposed Scoping and EIA project, as well as for each Basic Assessment project. Furthermore, separate reports (i.e. Basic Assessment and Scoping and EIA Reports) have been compiled for each project.

The original Applications for EA for the Scoping and EIA Projects were submitted to the DEA via courier on 30 September 2015, together with the Scoping Reports. Refer to Appendix E of this EIA Report for the proof of submission (i.e. courier waybills) of the original Application for EA, as well as Appendix H of the **Scoping Report** for a copy of the **original Application for EA**. The DEA acknowledged receipt of the Scoping Reports and original Applications for EA on 26 October 2015 via email (as shown in Appendix I.2 of this EIA Report). DEA Reference Numbers were assigned to each Scoping and EIA Project, as noted below. It is important to note that based on the design progression, certain listed activities as included in the original Application for EA are no longer triggered and two additional listed activities have become applicable (thus triggered) since the submission of the original Application for EA. An amended Application for EA has therefore been submitted to the DEA for decision-making together with this finalised EIA Report. The **amended Application for EA** is included in Appendix H of this **finalised EIA Report**. Additional information regarding the amended Application for EA is included in Chapter 4 of this finalised EIA Report.

The Applications for EA for the Basic Assessment projects were submitted to the DEA in March 2016 together with the Basic Assessment and EIA Reports for comment. The DEA acknowledged receipt of the Basic Assessment Reports and Applications for EA on 1 April 2016 via email (as shown in the separate appendices to the Basic Assessment Reports). The DEA Reference Numbers for the Basic Assessment Projects were accordingly provided as noted below.

The proposed 75 MW Solar PV facility projects (requiring a Scoping and EIA Process) are referred to as (together with the corresponding assigned DEA Reference Numbers):

- Kenhardt PV 1 - DEA EIA Reference: 14/12/16/3/3/2/837;
- Kenhardt PV 2 - DEA EIA Reference: 14/12/16/3/3/2/838; and
- Kenhardt PV 3 - DEA EIA Reference: 14/12/16/3/3/2/836.

The proposed 132 kV transmission line projects (requiring a Basic Assessment Process) are referred to as (together with the corresponding assigned DEA Reference Numbers):

- Kenhardt PV 1 - Transmission Line - DEA EIA Reference: 14/12/16/3/3/1/1547;
- Kenhardt PV 2 - Transmission Line - DEA EIA Reference: 14/12/16/3/3/1/1546; and
- Kenhardt PV 3 - Transmission Line - DEA EIA Reference: 14/12/16/3/3/1/1545.

The abovementioned integrated PPP approach, as well as the general approach to the Scoping and EIA Projects and the Basic Assessment Projects, were discussed with and approved by the DEA at a pre-application meeting, which was held on 17 September 2015. Appendix I.1 of this finalised 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 1.1 below shows the overall locality of the three proposed 75 MW Solar PV facility projects and the electrical infrastructure corridor (within which the proposed transmission lines will be constructed to support each Solar PV project).

This EIA Report therefore only discusses the proposed **Kenhardt PV 1** project, with this chapter providing an introduction to the proposed project, as well as information on the Project Applicant, the appointed Environmental Assessment Practitioner (EAP), and the specialist team.

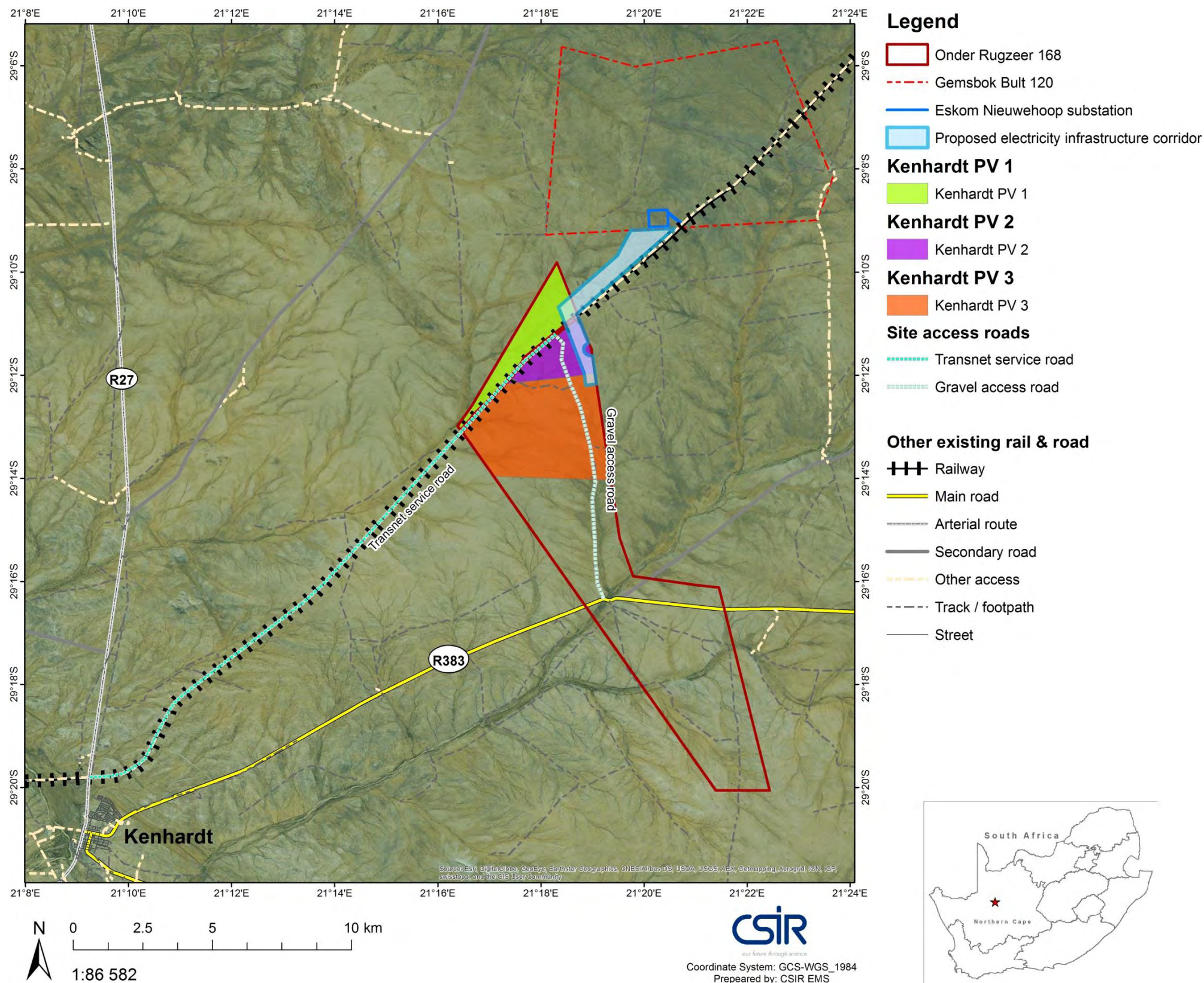


Figure 1.1: Locality of the three proposed 75 MW PV Facilities and Electrical Infrastructure Corridor

## 1.1. Project Applicant and Project Overview

Scatec Solar is an integrated Independent Power Producer (IPP) that is focused on making solar energy a sustainable and affordable source on a global scale. Scatec Solar was founded in 2001 and holds its headquarters in Norway. The company develops, builds, owns and operates a number of solar power plants internationally and within Africa. The company is growing significantly and is currently planned to provide a combined 207 MW of power in the United States, Honduras and Jordan. In addition, Scatec Solar collectively delivers more than 219 MW of power in the Czech Republic, South Africa and Rwanda. Specifically linked to investment within South Africa, Scatec Solar has been involved in the following major solar energy projects:

- The Linde Solar Plant (40 MW) is located in the Northern Cape and is considered to be the first of the large-scale PV plants in production from the second round of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).
- The Dreunberg Solar Plant (75 MW) is the only REIPPPP Solar PV Project to be located in the Eastern Cape.
- The Kalkbult Solar Plant (75 MW) is located in the Northern Cape and was the first REIPPPP project to be connected to the grid and operational in South Africa.

Scatec Solar was awarded another further 258 MW in the Fourth Round of the REIPPPP. Dyason's Klip 1, Dyason's Klip 2 and Sirius PV Project One were all anticipated to obtain Financial Closure in Quarter 4 of 2015.

Linked to enhancing its operations within South Africa, the 75 MW Solar PV facility (i.e. Kenhardt PV 1) proposed by Scatec Solar will cover an approximate area of 250 hectares (ha). The proposed project is located in proximity to the Eskom Nieuwehoop Substation, which is currently being constructed on the remaining extent of Portion 3 of Gemsbok Bult Farm 120 (as noted above).

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 100 MW Direct Current (DC) which produces 75 MW Alternating Current (AC) of electricity from PV solar energy. 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 Scatec Solar will implement the Self-Build Option for the additional electrical infrastructure to be constructed (which will be assessed separately as part of a Basic Assessment Process). Following the construction phase, the proposed transmission line will either be transferred into the ownership of Eskom or remain in the ownership of Scatec Solar.

The preferred site for the proposed Kenhardt PV 1 project includes approximately 450 ha of land, however the proposed solar facility and associated infrastructure require a development area of approximately 250 ha only (this excludes the access roads leading to the site). 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 16 of this finalised EIA Report.

The proposed project will consist of the following main components:

- **Solar Field**
  - Solar Arrays:
    - PV Modules;
    - Single Axis Tracking structures (aligned north-south), Fixed Axis Tracking (aligned east-west), Dual Axis Tracking (aligned east-west and north-south) or Fixed Tilt Mounting Structure (all options will be considered in the design);
    - Solar module mounting structures comprised of galvanised steel and aluminium; and
    - Foundations which will likely be drilled and concreted into the ground.

- Building Infrastructure:
  - Offices;
  - Operational and maintenance control centre;
  - Warehouse/workshop;
  - Ablution facilities;
  - Converter stations;
  - On-site substation building; and
  - Guard Houses.
- **Associated Infrastructure**
  - 132 kV overhead transmission line (which is the subject of a separate Basic Assessment Process, referred to as Kenhardt PV 1 - Transmission Line);
  - Associated electrical infrastructure at the Eskom Nieuwehoop Substation (including but not limited to an additional feeder bay(s), Busbar(s), transformer bay and extension to the platform at the substation (which is the subject of a separate Basic Assessment Process, referred to as Kenhardt PV 1 - Transmission Line);
  - On-site substation;
  - 33 kV internal transmission lines/underground cables;
  - Underground low voltage cables or cable trays;
  - Access roads;
  - Internal gravel roads;
  - Fencing;
  - Panel maintenance and cleaning area;
  - Stormwater channels; and
  - Temporary work area during the construction phase (i.e. laydown area).

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

## 1.2. Project Motivation (Including Need and Desirability)

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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 technology 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, solar energy projects have no direct water demand during operations, except for

periodic washing of solar panels. 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 for South Africa for the period 2010 to 2030 was released by government in 2010, and an updated report was published in 2013, which proposes to secure 17 800 MW of renewable energy capacity by 2030 (including wind, solar and other energy sources). In August 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 photovoltaic, biomass, biogas, landfill gas or small hydropower projects. On 18 August 2015, an additional procurement target of 6300 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 solar PV energy is 2200 MW.

In terms of the REIPPPP, the submitted proposals are then evaluated. Currently, the two main evaluation criteria for compliant proposals are price and economic development with a point allocation of 70/30 (DOE, 2013), 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 whose responses rank the highest (according to the aforementioned criteria) will have the greatest potential to be appointed as "Preferred Bidders" by the DOE. The first procurement phase of the DOE's REIPPPP includes five bidding windows. Scatec Solar intends to bid these projects in the 2016 bidding process (i.e. Round 5) to be potentially selected as an IPP. Additional information regarding the project contextualisation is provided in Chapters 2 and 5 of this finalised EIA Report.

### *1.2.1. Need and Desirability*

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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 (DEADP) also published a Guideline on Need and Desirability in 2010. The DEADP 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?). DEADP 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 1.1 includes a list of questions based on the DEADP 2010 Guideline to determine the need and desirability of the proposed project.

**Table 1.1: DEADP list of 14 questions to determine the “Need and Desirability” of a proposed project - Kenhardt PV 1**

<b>NEED</b>
<p><b>1. 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 projects and programmes identified as priorities within the credible IDP).</b></p> <p><b>Answer: Yes</b></p> <p><b>Justification:</b> 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 Strategic Environmental Assessment (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 Renewable Energy Development Zones (REDZs). The proposed solar facility falls within one of the potential eight REDZ. 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 90 and 150 skilled and 400 and 460 unskilled employment opportunities will be created during the construction phase. During the operational phase, approximately 20 skilled and 40 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><b>2. 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?</b></p> <p><b>Answer: Yes</b></p> <p><b>Justification:</b> 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 projects in the area. The need for job opportunities and electricity necessitates that these types of projects be undertaken in the area. The preferred project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed Kenhardt PV 1, PV 2 and PV 3 projects proceed, approximately 750 ha of the land will be collectively developed on and it is not expected that this will threaten the agricultural activities present on site. As noted in Chapter 12 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.</p>



**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. As noted above, Scatec Solar intends to submit this project 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 this 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.

**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 located approximately 3 km from the 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 (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:

- 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, 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. If the Transnet Service Road cannot be used, the unnamed farm road will need to be widened by more than 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. It was noted in the EIA Report, which was released for a 30-day comment period in March 2016, that confirmation of the availability of the services would be obtained during the 30-day review of the EIA Report. However, during the 30-day review of the EIA Report, several emails were sent to the municipality (i.e. ZF Mgcawu District Municipality, !Kheis Local Municipality and the Kai !Garib Local Municipality) to obtain and seek

confirmation of services. Copies of these follow up emails are included in Appendix E of this finalised EIA Report. To date, no responses have been received from the municipality in this regard. Telephonic calls were also made, however no engagements were able to be made.

**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 activity is furthermore proposed on agricultural land with little or no existing and planned infrastructure. 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. No impacts of high significance (with the implementation of mitigation measures) were identified in the EIA. As noted in Chapter 12 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 and the potential positive impact of additional land use income were both rated with a very low significance (without the implementation of mitigation measures) in the Soils and Agricultural Potential Assessment.

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 plant 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 EMFs), and if so, can it be justified in terms of sustainability considerations?**

Answer: No

Justification: It is not expected that the approval of the proposed project would compromise the integrity of the existing environmental management priorities for the area. Furthermore, mitigation measures have been recommended as part of the EIA Process to manage potential negative environmental impacts that may occur during the construction, operational and potential decommissioning phases. To this end, an Environmental Management Programme (EMPr), which is included as Part B of this finalised EIA Report, 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.

As noted above, the preferred 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.

Section 2.1.4 of the Siyanda District Municipality (now known as ZF Mgcawu District Municipality) Environmental Management Framework 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. Over-exploitation of the groundwater has not been experienced in the EMF area”. As mentioned in the Scoping Report, the Applicant planned to make use of groundwater as a water source for the cleaning of the PV panels during the operational phase. However, the Geohydrological Assessment (included in Chapter 11 of this EIA Report) has concluded that groundwater should not be used as a source of water for the construction and operational phases, as the groundwater on site is limited and of a poor quality. Additional information regarding the possible use of groundwater is included in the Geohydrological Assessment (Chapter 11 of the EIA Report).

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

Answer: Yes

Justification: As discussed above and in Chapter 5 of this finalised EIA Report, the solar resource of this area is high, which makes it a very favourable location for the proposed solar facility. In terms of land-use and sense of place, the facility will be located on marginal agricultural land. Although the solar facility proposed on the property is deemed a commercial land-use and not for agricultural purposes, only an estimated 250 ha of the total property area will be developed on for this specific proposed project (i.e. Kenhardt PV 1). However, if the proposed Kenhardt PV 1, PV 2 and PV 3 projects proceed, approximately 750 ha of the land on the remaining extent of Onder Rugzeer Farm 168 will be collectively developed on. The remaining extent of Onder Rugzeer Farm 168 extends approximately **5552 ha** in area and if all three solar PV projects proceed, only 13.5 % of the total farm area will be developed on.

Currently, Eskom is constructing a substation which would evacuate electricity produced by the proposed facility, and due to the presence of the substation, the land use is favoured from an electrical landscape perspective. In addition, 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. As noted in the Visual Impact Assessment (Chapter 8 of this EIA Report), the visual intrusion will be moderate for visual receptors on surrounding farms since the landscape is already transformed by existing structures (as mentioned above), however the Solar PV facility will be clearly noticeable. In addition, motorists will potentially pass within 100 m

of the proposed solar field.

As noted in Chapter 12 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 and the potential positive impact of additional land use income were both rated with a very low significance (without the implementation of mitigation measures) in the Soils and Agricultural Potential Assessment.

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

Answer: Limited impact in terms of natural sensitivity and potentially negative in terms of cultural areas.

Justification: The impact on sensitive natural areas would be limited. The built environment was considered as part of the Heritage Impact Assessment (Chapter 9 of this EIA Report). The Heritage Impact Assessment concluded that the proposed project will not affect any buildings and it also established that no archaeological sites were found on site (i.e. archaeological material in the form of background scatter was located across much of the site but this is of very low heritage significance). The Heritage Impact Assessment also notes that a single possible grave was located within the site and that it should be avoided with a buffer of at least 5 m or else tested and, if necessary, exhumed prior to construction. However, it is important to note that the likely grave found within the Kenhardt PV 1 study area at waypoint 742 falls outside of the actual development footprint and layout as shown in Chapter 16 and Appendix J of this finalised EIA Report. Nevertheless, this area will effectively be a no-go area. The Heritage Impact Assessment also states that the landscape was identified as a heritage resource but, because of the presence of electrical and other infrastructure in the area, the significance of new impacts in heritage terms is considered to be low. The sensitive features identified in the Heritage Impact Assessment have been mapped and indicated in Chapter 9 and Chapter 16 of this EIA Report).

With regards to the natural environment, the Ecological Impact Assessment (included in Chapter 7 of this EIA Report) identified sensitive environmental features that would need to be avoided by the proposed development.

Chapter 16 includes an environmental sensitivity map that was produced based on the input obtained from the various specialist studies (as discussed in Chapter 16 of this finalised EIA Report). Environmental features that have a high environmental sensitivity have been avoided by the proposed siting of the proposed PV facility (i.e. the development envelope approach); therefore the overall impact of the proposed project on the sensitive features is expected to be low. Please refer to Chapter 16 of this report for detailed discussion on the development envelope of the project.

As noted above, an EMPr has been compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. 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 has been assessed as part of the Visual Impact Assessment (Chapter 8 of this EIA Report).

**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: No significant negative impacts were identified as part of the EIA.

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 of low significance.

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) have been included in the EMPr (Part B of the EIA Report).

- **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 (where applicable) have been included in the EMPr (Part B of the EIA Report) 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. As noted above, this has been assessed in the Visual Impact Assessment (Chapter 8 of this EIA Report).

Notwithstanding the above, 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: Solar energy facilities can be dismantled and completely removed from the site leased for the development and do 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 12 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 (without the implementation of mitigation measures).

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

Answer: No

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 report). The list of projects that were considered in the assessment of cumulative impacts is included in Chapter 4 of this finalised EIA Report. "Unacceptable" cumulative impacts are seen as impacts that would have a high negative impact significance. Overall, no cumulative impacts were identified with a high significance with the implementation of mitigation measures.

The findings of the Electromagnetic Interference and Radio Frequency Interference Surveys conducted to comply with the requirements of the SKA South Africa are summarised in Chapter 15 of this EIA Report, with the complete technical report included in Appendix K of the EIA Report. This assessment also discusses cumulative impacts from a specific Electromagnetic and Radio Frequency Interference perspective. The technical report has been reviewed by the SKA Project Office, and their comments are included in Chapter 6 and Appendix G of this finalised EIA Report. The Project Applicant has confirmed that they will comply with the findings of the EMI and RFI Studies, by implementing the recommended mitigation measures into the design of the proposed facility.

### 1.3. Requirements for an EIA

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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”.*

Chapter 4 of this finalised EIA Report contains the detailed list of activities contained in R983, R984 and R985 which are triggered by the various project components and thus form part of this Scoping and EIA Process. As noted above, these listed activities are also included in the Amended Application for EA that has been submitted to the DEA for consideration together with the finalised EIA Report. 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, Scatec Solar, 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.

### 1.4. EIA Team

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As previously noted, the CSIR has been appointed by Scatec Solar 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 and possible alternatives 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 finalised EIA Report.

The EIA team which is involved in this Scoping and EIA Process is listed in Table 1.2 below. This team includes a number of specialists which have been involved to date, in the EIA Process. Appendix B of this finalised EIA Report includes declaration of interest by the specialists.

**Table 1.2: The EIA Management Team**

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
<b>Environmental Assessment Practitioners</b>		
Paul Lochner	CSIR	Technical Advisor and Quality Assurance (EAPSA) Certified
Surina Laurie	CSIR	Project Leader ( <i>Pr. Sci. Nat.</i> )
Rohaida Abed	CSIR	Project Manager ( <i>Pr. Sci. Nat.</i> )
<b>Specialists</b>		
Simon Bundy	Sustainable Development Projects cc	Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna)
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
Julian Conrad	GEOSS	Geohydrological Assessment
Johann Lanz	Private	Soils and Agricultural Potential Assessment
Rudolph du Toit	CSIR	Social Impact Assessment
P. S. van der Merwe and A. J. Otto	MESA Solutions (PTY) Ltd	Electromagnetic Interference and Radio Frequency Interference Surveys

It should be noted that the Social 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 as part of the acceptance of the Scoping Report (Appendix I.4 of this finalised EIA Report).

A Traffic Impact Statement was also compiled by the EAP and is included in Chapter 14 of this finalised EIA Report; however it serves as a general description of the existing and predicted traffic associated with the proposed project and does not classify as a specialist study in terms of Appendix 6 of the 2014 NEMA EIA Regulations.

## 1.5. Details and Expertise of the Environmental Assessment Practitioners

Over the past 30 years the CSIR has been involved in a multitude of projects 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 Surina Laurie, who is supported by the Project Manager, Rohaida Abed. 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 of this EIA Report includes a declaration of and affirmation by the EAP as required by the 2014 EIA Regulations.

**Paul Lochner** - Paul has 22 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 projects 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.

**Surina Laurie** - Surina is a Senior EAP in the EMS group of the CSIR and she has a Masters 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 5 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 undertaking several Solar PV EIAs in the Northern Cape and Free State. Surina was the Project Manager for the proposed (adjacent) Nieuwehoop Solar Development EIA projects, which have received positive EAs.

**Rohaida Abed** - Rohaida is a Junior EAP in the EMS group of the CSIR and she has a Masters degree in Environmental Science and is a Registered Professional Natural Scientist (Registration Number: 400247/14) with the SACNASP. She has experience in the Environmental Management field, and has been involved in various transport infrastructure related projects as an Environmental Control Officer. She has also been involved in EIAs relating to Port infrastructure and Bulk Liquid Storage facilities in the capacity of Project Manager.

## 1.6. Objectives for this EIA Report

This EIA Report was preceded by a comprehensive Scoping Process. During the Scoping Phase, the Scoping Reports for the Kenhardt PV 1, PV 2 and PV 3 projects were made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period extending from 25 September 2015 to 27 October 2015. An Addendum to the Scoping Report was released to I&APs for a further 30-day comment period extending from 6 October 2015 to 5 November 2015. The addendum included additional information that was requested by the DEA relating to an assessment of alternatives in the Scoping Phase. The comments received from stakeholders during the 30-day review of both the Scoping Report and Addendum were incorporated into the Scoping Report (where required), and the finalised Scoping Report was submitted to the DEA in November 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. It is important to note that (for the purpose of completeness and continuity), the comments received from I&APs during the Scoping Phase are included in Appendix G of this finalised EIA Report. The DEA accepted the finalised Scoping Report and Plan of Study for EIA on 8 December 2015, which marked the end of the Scoping Phase (Appendix I.4 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).

As noted above, the EIA Report was released to stakeholders for a 30-day review period (together with the BA Reports). The 30-day comment period extended from 3 March 2016 to 5 April 2016. All comments received have been included in this finalised EIA Report, for submission to the 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) stipulates 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 is 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 1.3.

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 finalised 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 I.4 of this EIA Report). An overview of this compliance is shown in 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 13) provides an overview table showing compliance with the 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) were informed of the release of the EIA Report for the 30-day comment period in March 2016. As noted above, all comments received have been recorded and addressed in this finalised EIA Report (as applicable) for submission to the authorities for decision-making. It is important to note that no comments have been received from I&APs and stakeholders during the 30-day comment period that warrants significant amendment of the specialist studies or their Terms of Reference.

**Table 1.3: 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 3 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;	Chapters 7 to 13 and Chapter 16
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 affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. if no alternative development locations for the activity were	Chapter 2, Chapter 4, Chapter 5, Chapter 6, Chapters 7 to 13 and Chapter 16

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
	<ul style="list-style-type: none"> <li>x. investigated, the motivation for not considering such; and</li> <li>a concluding statement indicating the preferred alternative development location within the approved site;</li> </ul>	
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> <ul style="list-style-type: none"> <li>i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</li> <li>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;</li> </ul>	Chapter 5, Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (j)	<p>An assessment of each identified potentially significant impact and risk, including-</p> <ul style="list-style-type: none"> <li>i. cumulative impacts;</li> <li>ii. the nature, significance and consequences of the impact and risk;</li> <li>iii. the extent and duration of the impact and risk;</li> <li>iv. the probability of the impact and risk occurring;</li> <li>v. the degree to which the impact and risk can be reversed;</li> <li>vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and</li> <li>vii. the degree to which the impact and risk can be mitigated;</li> </ul>	Chapter 5, Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (l)	<p>An environmental impact statement which contains-</p> <ul style="list-style-type: none"> <li>i. a summary of the key findings of the environmental impact assessment;</li> <li>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</li> <li>iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</li> </ul>	Chapters 7 to 14, and Chapter 16 and Appendices J.1 and J.2
Appendix 3 - (3) (m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapters 7 to 14, and Chapter 16
Appendix 3 - (3) (q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 16
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)	<p>An undertaking under oath or affirmation by the EAP in relation to -</p> <ul style="list-style-type: none"> <li>i. the correctness of the information provided in the reports;</li> <li>ii. the inclusion of comments and inputs from stakeholders and interested</li> </ul>	Appendix B

Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Location in this EIA Report
	<p>and affected parties;</p> <ul style="list-style-type: none"> <li>i. the inclusion of inputs and recommendations from the specialist reports where relevant; and</li> <li>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;</li> </ul>	
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 16
Appendix 3 - (3) (u)	<p>An indication of any deviation from the approved scoping report, including the plan of study, including -</p> <ul style="list-style-type: none"> <li>i. any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and</li> <li>ii. a motivation for the deviation;</li> </ul>	Chapter 4
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 J, Appendix K and Part B of this finalised EIA Report
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

# EIA REPORT



## CHAPTER 2: Project Description

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

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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 Scatec Solar) for the proposed 75 MW Solar PV facility, referred to as Kenhardt PV 1.

The purpose of this chapter is to present sufficient project information to inform the EIA Process in terms of design parameters applicable to the project. It is important to note that the project description details are preliminary at this stage and it is likely that some of the details presented herein may change during the detailed design phase and upon further engineering investigations however the information provided below is seen as the worst-case scenario for the project. It is important to note that the specialist assessments have also been based on the worst-case scenario in terms of the project specifications (such as the development footprint, dimensions, height etc.).

### 2.1 Site Selection

Additional information regarding the site selection process is provided in Chapter 5 of this EIA Report. The preferred and alternative sites were selected based on national level considerations (high solar radiation in the Northern Cape) and the fact that the proposed site currently falls within the REDZ 7. On a site specific level, the site was deemed suitable due to all the site selection factors (such as land availability, distance to the national grid, site accessibility, topography, fire risk, current land use and landowner willingness) being favourable.

### 2.2 Technology Selection

The different options for solar panel types and mounting systems that were investigated by Scatec Solar and deemed feasible for the solar facility were discussed in the Scoping Report. The preferred mounting system to be constructed on site will be determined closer to the detailed design phase and after taking into consideration the economic viability, water requirements, land requirements, efficiency and potential environmental impacts.

#### 2.2.1 Solar Panel Type

The Concentrated PV (CPV), Concentrated Solar Power (CSP) and conventional PV solar cells were considered for the proposed facility. The preferred solar panel type that will be constructed on site is the Conventional PV technology (Figure 2.1) that does not make use of any mirrors or lenses and generates electricity by converting solar radiation energy into a DC which then needs to be converted to an AC to connect to the grid.



Figure 2.1: Conventional PV Technology<sup>1</sup>

<sup>1</sup> Sources: <http://cleantechnica.com/2010/05/13/how-to-get-25-of-world-electricity-from-solar-energy-by-2050>



### 2.2.2 Mounting System

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

- Single axis tracking systems;
- Fixed axis tracking systems;
- Dual axis tracking systems; and
- Fixed tilt mounting structures.

In a fixed axis tracking system, 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. In a dual axis tracking system, the PV panels can follow the sun from east to west, as well as follow the sun's altitude (which results in an optimal angle of radiation onto the panel (Vermaak, 2014)). Dual axis tracking systems can therefore follow the sun throughout the day both horizontally and vertically.

The type of mounting system will be confirmed during the detailed engineering phase and all options have been included in the proposed project description and whichever mounting system is selected would have no impact on any aspect assessed within the EIA.

## 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.

This project is being developed to have a generation capacity of 75 MW AC and up to 100 MW DC. As mentioned in Chapter 1 of this finalised 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 facility is to be constructed will be leased by Scatec Solar from the property owner/landowner for the life span of the project. The preferred location within the site, as determined during the Scoping Phase, includes approximately 450 ha of land. Due to the fact that this project only requires 250 ha of land, there is scope to avoid major environmental constraints through the final design of the facility. To this end, the larger 450 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 16 of this finalised EIA Report). This map shows the sensitivities on site (terrestrial, aquatic, and sensitive heritage features) within the larger 450 ha buildable area that was assessed. Based on this map, the preferred location for the 250 ha Kenhardt PV 1 facility, also known as the Development Envelope, avoids the sensitive features that were identified by the specialists within the original 450 ha buildable area. Based on the boundaries of the Development Envelope and the constraints of the environmental sensitivities, a site layout has also been preliminarily determined for this project (as discussed in Chapter 16 of this EIA Report). 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 during this EIA. The Development Envelope is considered to be a “box” in which the proposed project components discussed within this chapter can be constructed at whichever location (**within the boundaries of the assessed Development Envelope**) without requiring an additional assessment or change in impact significance. Any changes to the layout will therefore be considered as non-substantive. This is discussed further in Chapter 16 of this finalised EIA Report. It should be noted that a similar approach has been followed for the electrical

infrastructure and transmission lines, which has been assessed as part of the separate Basic Assessment Processes. To this end, an electrical infrastructure corridor has been proposed for the proposed transmission lines and electrical infrastructure (as shown in Figure 2.2).

As discussed above, this project will utilise PV technology to generate electricity. 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 detailed discussed 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), Fixed Axis Tracking (aligned east-west), Dual Axis Tracking (aligned east-west and north-south) or Fixed Tilt Mounting Structure;
    - Solar module mounting structures comprised of galvanised steel and aluminium; and
    - Foundations which will likely be drilled and concreted into the ground.
  - Building Infrastructure:
    - Offices;
    - Operational and maintenance control centre;
    - Warehouse/workshop;
    - Ablution facilities;
    - Converter/Inverter stations;
    - On-site substation building; and
    - Guard Houses.
- **Associated Infrastructure**
  - 132 kV overhead transmission line (which is the subject of a separate Basic Assessment Process, referred to as Kenhardt PV 1 - Transmission Line);
  - Associated electrical infrastructure at the Eskom Nieuwehoop Substation (including but not limited to an additional feeder bay, Busbars, transformer bay and extension to the platform at the substation) (which is the subject of a separate Basic Assessment Process, referred to as Kenhardt PV 1 - Transmission Line);
  - On-site substation;
  - 33 kV internal transmission lines/underground cables;
  - Underground low voltage cables or cable trays;
  - Access roads;
  - Internal gravel roads;
  - Fencing;
  - Panel maintenance and cleaning area;
  - Stormwater channels; and
  - Temporary work area during the construction phase (i.e. laydown area).

The overall locality of the proposed project is shown in Figure 2.2 below. Only the preferred site for Kenhardt PV 1 has been assessed during the EIA Phase.

As noted previously, the proposed project will take place on the remaining extent of Onder Rugzeer Farm 168 (Surveyor General 21-Digit Code: C0360000000016800000). The co-ordinates of the boundary/corner points of the preferred project site (i.e. Kenhardt PV 1) are shown in Table 2.1 below. The co-ordinates of the approximate mid-point of the preferred project site (i.e. Kenhardt PV 1) are 29° 11' 17.73"S and 21° 17' 45.82"E.

**Table 2.1: Co-ordinates of the Corner Points of the Preferred Project Site**

<b>Point</b>	<b>Latitude</b>	<b>Longitude</b>
A - North East	29° 09' 49.47"S	21° 18' 18.73"E
B - South West	29° 12' 58.77"S	21° 16' 24.64"E
C - South-South West	29° 13' 4.08"S	21° 16' 28.50"E
D - South	29° 11' 35.89"S	21° 17' 47.39"E
E - East	29° 10' 49.56"S	21° 18' 42.75"E

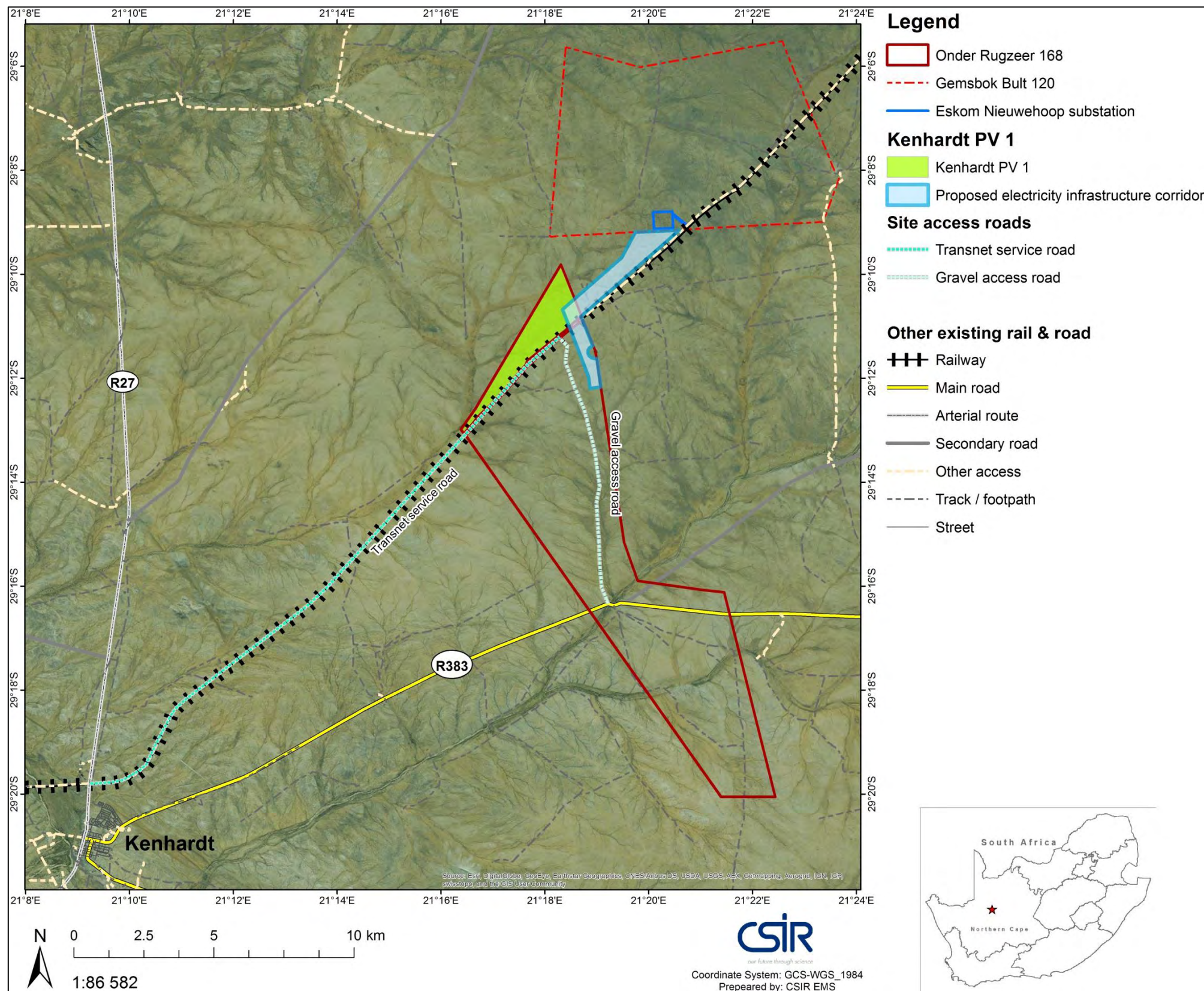


Figure 2.2: Proposed Locality of the Kenhardt PV 1 project (including the Electrical Corridor which is assessed separately as part of a Basic Assessment Process)

### 2.3.1 Solar Field

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

#### 2.3.1.1 Solar Arrays

As noted above, the total footprint of the solar facility is estimated to be approximately 250 ha. This 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 but a preliminary site layout plan has been included in Chapter 16 and Appendix J of this finalised EIA Report. The PV array is estimated to cover approximately 220 ha.

- **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 2.3).

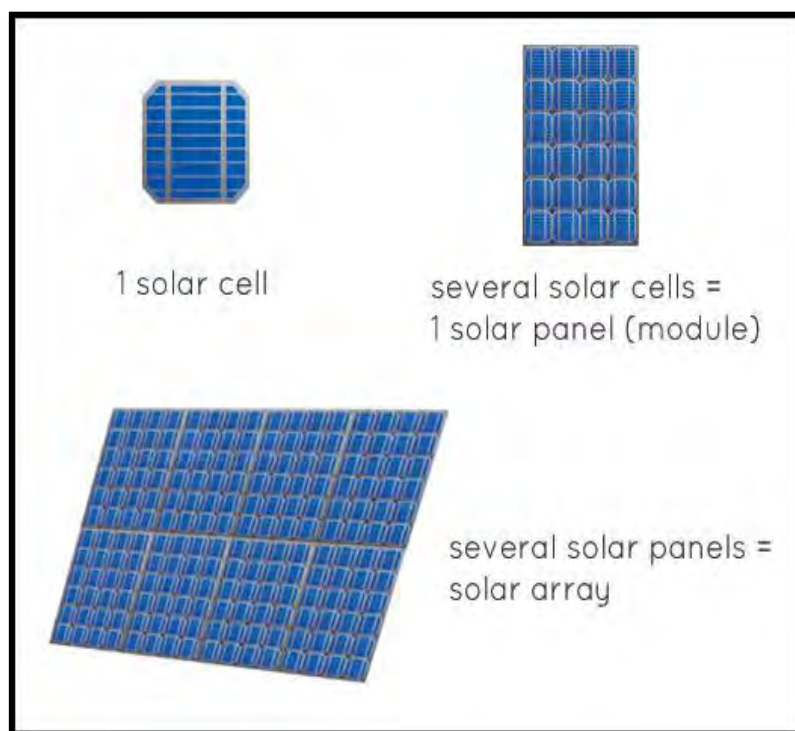


Figure 2.3: Components of the Proposed PV Installation (Source: Go Greena, 2013)

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 2.4. The entire structure is not expected to exceed 10 m in height (measured from the ground), which is considered the worst-case. This system may be fixed, or may track the movement of the sun (either by adopting Fixed Axis Tracking, Single Axis Tracking, Dual Axis Tracking or Fixed Tilt Mounting Structures as explained above).

All the arrays will be wired to converter/inverter stations that converts DC into AC. Section 2.3.2.1 of this chapter provides additional detail regarding the converter stations and connection thereto. It should be noted that a converter station is also referred to as an inverter station.



Figure 2.4: 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 2.5).

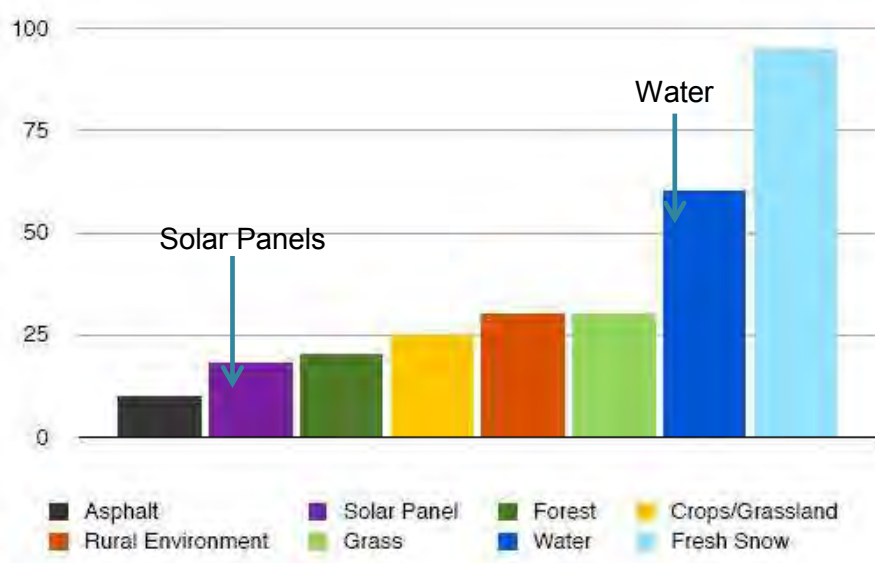


Figure 2.5: Reflected Energy Percentage of Solar Panels compared to other Materials (Source: Spaven Consulting, 2011)

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 Scatec Solar 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.

### 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, converter stations, on-site substation and substation building, laydown areas and security enclosures. The on-site substation building is expected to extend approximately 12 m in height, with a maximum footprint of 20 000 m<sup>2</sup>. The Visual Impact Assessment (Chapter 8 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. The buildings will likely be of single storey design, with the largest building (i.e. Control Centre Building) unlikely to exceed 6 m in height and 500 m<sup>2</sup> plan dimensions. The offices, operational and maintenance control centre, warehouse/workshop and operations offices (including ablution facilities) are expected to extend approximately 7 m high. The converter stations are expected to extend approximately 2.5 m high (with a maximum height of 7 m) and cover an area of 2500 m<sup>2</sup>. Security will be required to guard the main facility and support infrastructure and therefore two guard cabins 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. Detailed design will follow as the development progresses however a preliminary site layout plan has been included in Chapter 16 and Appendix J of this EIA Report.

## 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 stations by low voltage underground (internal) DC cables or cable trays. Power from the converter/inverter station will be collected in medium voltage transformers through underground (internal) AC cables, cable trays or AC cables which are pole-mounted depending on voltage level and site conditions.

The converter stations will in turn be connected to the proposed on-site substation, via medium voltage (33 kV) underground (internal) cables or overhead lines (extending approximately 9 m high with an estimated maximum footprint of 7500 m<sup>2</sup>), 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 being constructed on the Gemsbok Bult Farm (as mentioned above). An overhead transmission line (132 kV/33 kV/22 kV) will be constructed for each 75 MW Solar PV Facility and is expected to extend approximately 4 - 9 km in length (between the proposed on-site substation and the Eskom Nieuwehoop Substation), with steel or concrete tower structures (extending approximately 22.5 to 30 m in height). Various options have been put forward for the connection of the transmission lines for the Kenhardt PV 1, PV 2 and PV 3 projects. 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 1000 m wide) as shown in Figure 2.2. Currently, Scatec Solar will implement the Self-Build option and may transfer the ownership of the transmission line to Eskom. Therefore, as mentioned in Chapter 1 of this finalised EIA Report, this corridor has been assessed as part of separate Basic Assessment Processes. The proposed electrical infrastructure, which includes the 132 kV transmission line corridor and a collector substation, has been assessed separately as part of a Basic Assessment Process (i.e. Kenhardt PV 1 - Transmission Line).

It is important to note that all high voltage infrastructure leading up to the Point of Connection (i.e. Scatec Solar's section of the proposed collector substation) will be covered by this EIA Process (i.e. for Kenhardt PV 1). 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 and has been assessed separately as part of a Basic Assessment Process (i.e. Kenhardt PV 1 - Transmission Line).

As previously mentioned, a separate EA was granted to Eskom Holdings SOC Limited for the construction of the Nieuwehoop Substation on 21 February 2011 (DEA Reference Number: 12/12/20/1166).

Figure 2.6 provides a summary of the electrical connections required for the Kenhardt PV 1 and Kenhardt PV 1 transmission line project.

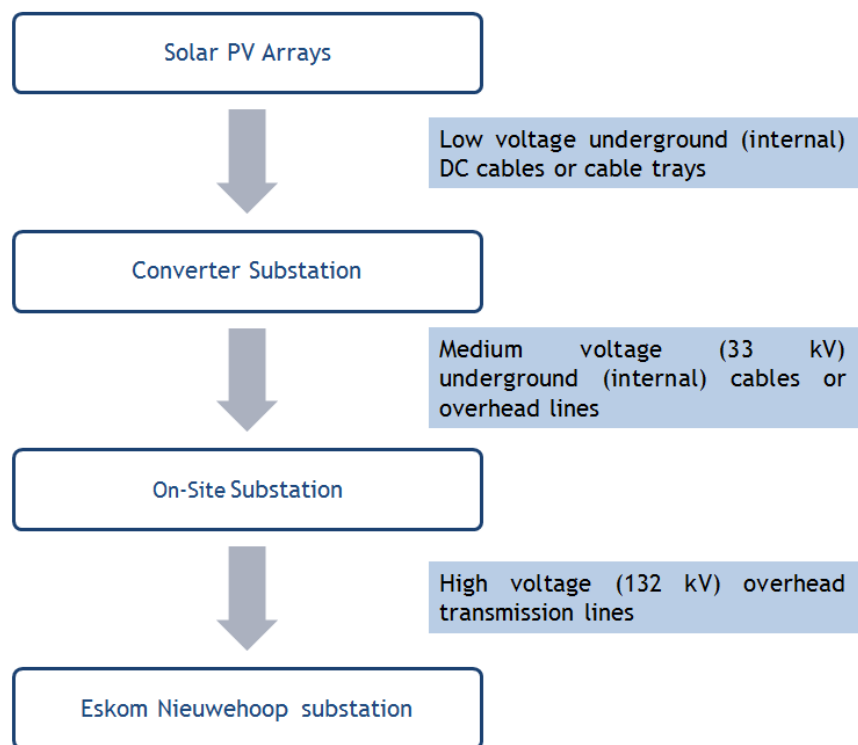


Figure 2.6: Components of the Proposed PV Installation and Electrical Connections

### 2.3.2.2 Roads

The proposed project site can be accessed via an existing gravel road (an unnamed farm road) and the existing Transnet Service Road (private). Both access routes will be considered in the design of the facility and have been included in the proposed project. The R27 extends from Keimoes (in the north) 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 can be accessed from the R27. The existing gravel road (i.e. unnamed farm road) can be accessed from the R383 Regional Road also via the R27 National Road. The Transnet Service Road and unnamed farm road are both (in some sections) wider than 8 m, however in certain sections; the unnamed farm road is believed to be about 2-3 m wide. A further access road will be constructed from either the Transnet Service Road or the unnamed farm road to the proposed Kenhardt PV 1, 2 and 3 facilities (as shown in the preliminary layout in Chapter 16 and Appendix J of this finalised EIA Report).

Should the Transnet Service Road be considered the preferred access road (as noted above), it is proposed that an internal gravel road be constructed from the road to the proposed site. This internal gravel road is not expected to exceed 6 m in width. The length of the internal gravel road will be confirmed as the location, design and layout of the facility progresses; however a preliminary site layout plan has been included in Chapter 16 and Appendix J of this finalised EIA Report. It is estimated that the internal gravel access roads will be 6 m wide and 2000 m long. 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. In order to make use of the unnamed farm road and to ensure easy access to and mobility of large trucks, the unnamed farm road will need to be upgraded and widened by more than 6 m (where required). Exact specifications of the widening and upgrading of the unnamed farm gravel road will be confirmed during the detailed design phase. It is expected that the upgrading and widening of the unnamed farm road will result in crossings of major and minor drainages lines on site. The details of these crossings will be determined during the detailed design phase. The Ecological Impact Assessment (Chapter 7 of this finalised EIA Report) has recommended a 32 m buffer around the major drainage lines within the study area. The existing unnamed farm road runs over the Rugseers River. Therefore potential upgrade and widening of the existing farm road will be undertaken within 32 m of a water course. However, it is important to note that the 2014 EIA Regulations allow for development within watercourses or within 32 m of water courses by way of listed activities, which if triggered, need to be assessed as part of a Basic Assessment or an EIA. Chapter 4 of this finalised EIA Report includes the listed activities that are applicable to the proposed project and have been included in the Amended Application for EA, including those activities that will result in activities and construction work within 32 m of water courses (i.e. Activity 12 (x) and (xii) of GN R983; Activity 19 (i) of GN R983; and Activity 18 (a) (ii) and (ii) of GN R985). Therefore, it is understood that the widening and upgrading of the unnamed farm road is permitted to take place in terms of the EIA Regulations (should the project receive EA). Mitigation and management actions have been included in the EMP (Part B of this finalised EIA Report) and the Ecological Impact Assessment (Chapter 7 of this finalised EIA Report).

Internal roads extending approximately 4 m wide will be constructed within the project footprint of the proposed PV plant. A perimeter road will also be constructed along the boundary of the proposed PV plant, which will extend approximately 2.5 m wide.

Overall, the proposed internal roads, the gravel access road, the perimeter roads will have a maximum length of 20 000 m in total.

In terms of traffic generation, a Traffic Impact Statement has been provided in Chapter 14 of this finalised EIA Report.

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

- Transformers;
- PV Modules;
- Converter components;
- 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. A description of the vehicle trips are provided in Chapter 14 of this finalised EIA Report.

### *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 2.6 to 3 m high. Access points will be managed and monitored by an appointed security service provider. The type of fencing will either be of palisade or mesh type; however it may be a fully electrified option. Detailed design will follow as the development progresses but a preliminary site layout plan has been included in Chapter 16 and Appendix J of this finalised EIA Report.

### *2.3.2.4 Panel Maintenance and Cleaning*

The accumulation of dust on solar panels generally negatively influences the productivity of solar facilities. As such the panels require regular cleaning. Cleaning and maintenance of the panels will require water. During the Scoping Phase, it was noted that the Project Applicant intended to make use of existing boreholes to source groundwater (if available and if suitable) for the panel cleaning process. If the groundwater was available and suitable, the water would be transported from the boreholes to the Solar PV facility via water pipelines and stored on site in suitable containers during the operational phase. However, the Geohydrological Assessment undertaken as part of the EIA Phase (Chapter 11 of this finalised EIA Report) studied the quality of the groundwater and its suitability for use. The Geohydrological Assessment noted that the groundwater on site is extremely low in terms of yields and is not suitable for use. The specialists do not recommend that groundwater be used as a source of water during the construction and operational phases.

Based on the findings of the Geohydrological Assessment (Chapter 11 of this EIA Report), the Applicant no longer plans to make use of groundwater during the construction and operational phases. As noted in the Scoping Report, if the groundwater is not sufficient or suitable for use, water will then be sourced from the municipal supply if required (i.e. delivery via water tankers).

It is proposed that panel cleaning will take place quarterly; however this may be revised should the site conditions warrant more frequent cleaning. It is estimated that the panel washing process will require approximately 4 million to 6 million litres of water per year during operations. The quality of the groundwater and its suitability for use has been determined as part of the Geohydrological Assessment (Chapter 11 of this EIA Report).

At this stage, no water is planned to be abstracted from or discharged to any surface water systems.

### *2.3.2.5 Stormwater, Sewage, Waste and Water Requirements*

Stormwater channels will be constructed on site to ensure that stormwater run-off from site is appropriately managed. At this stage of the design it is understood that the stormwater infrastructure will extend approximately 3000 m in length, and will have an internal diameter less than 0.36 m, and a peak throughput of less than 120 l/s. 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 will not exceed 1000 m in length, and will have an internal diameter of less than 0.36 m, and possibly a peak throughput of less than 120 l/s.

The project will require sewage services during the construction and operational phases. Low volumes of sewage or liquid effluent are estimated during both phases. Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction and operational phases, which will be regularly serviced and emptied by a suitable (private) contractor on a weekly basis. The waste water will be transported to a nearby Waste Water Treatment Works for treatment. 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. Feedback from the municipality (in terms of capacity) was attempted to be sought during the EIA Phase (as noted below). Due to the remote locality of the farm, sewage cannot be disposed in the municipal waterborne sewage system.

In terms of waste generation, general waste generated during the construction and operational phases will be temporarily and safely stored in a skip on site and periodically removed on a regular basis to a licenced waste disposal facility by a suitable contractor. During the construction phase an estimated amount of less than 5 m<sup>3</sup> non-hazardous solid construction waste is likely to be produced per month. In addition, a skip will be placed on site and any damaged or broken PV panels (i.e. those not returned to the supplier) will be stored in this skip. A specialist waste management company will be commissioned to manage and dispose of this waste. During the operational phase after construction, the facility will produce minor amounts of general waste (as a result of the offices). Waste management is discussed in the EMPr (Part B of this EIA Report).

As discussed above (in Section 2.3.2.4), water pipelines will no longer need to be constructed to transfer groundwater from existing boreholes to the proposed facility (based on the findings of the Geohydrological Assessment). Water will instead be supplied by the municipality and transported to the site via tankers (as discussed in Section 2.3.2.4 above). During the construction and operational phases, it is proposed to have 5 to 10 water tanks (i.e. suitable containers or reservoir tanks (or similar)) on site. The capacity of the tanks are estimated to be approximately 10 000 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 month (via water tankers from the municipality). It is estimated that approximately 10 000 m<sup>3</sup> and 5 000 m<sup>3</sup> of water will be required per year during the construction and operational phase, respectively.

In terms of electricity supply, the developer will be provided with auxiliary supply from already existing Eskom infrastructure. The exact location of this source as well route for provision of such supply is still to be determined by Eskom.

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. As explained in Chapter 1 of this finalised EIA Report, during the 30-day review of the EIA Report, several emails were sent to the municipality to obtain and seek confirmation of services. Copies of these follow up emails are included in Appendix E of this finalised EIA Report. To date, no responses have been received from the municipality in this regard. Telephonic calls were also made, however no engagements were able to be made.

### 2.3.3 Summary of Infrastructure

A summary of the project components are shown in Table 2.2 below. Refer to Appendix J of this finalised EIA Report for the site layout plan which also provides these details.

**Table 2.2: Specifications of the Project Components**

Component	Description
<b>Solar Field: 250 ha</b>	
Type of Technology	PV Technology
Generation Capacity	75 MW AC and up to 100 MW DC
PV Panels Structure (with following possible tracking and mounting systems): <ul style="list-style-type: none"> <li>▪ Single axis tracking systems;</li> <li>▪ Fixed axis tracking systems;</li> <li>▪ Dual axis tracking systems; and</li> <li>▪ Fixed tilt mounting structures.</li> </ul>	Height: 10 m (maximum)
Area of PV Array	Footprint: 220 ha (maximum)
Total Surface Area to be covered (including all associated	Footprint: 250 ha

Component	Description
infrastructure and roads etc. (excluding main access road to site))	
<b>Building Infrastructure</b>	
Total Area occupied by buildings	Footprint: 1 500 m <sup>2</sup>
Offices	Height: 7 m Footprint: 1 000 m <sup>2</sup> (maximum)
Operational and Maintenance Control Centre	Height: 6 m (7 m worst case) Footprint: 500 m <sup>2</sup>
Warehouse/Workshop	Height: 7 m Footprint: 500 m <sup>2</sup>
Ablution Facilities	Height: 7 m Footprint: 50 m <sup>2</sup>
Converter Stations	Height: 2.5 m to 7 m (maximum) Footprint: 2 500 m <sup>2</sup>
Number of Converter/Inverter Stations Required	24
Area occupied by the Converter/Inverter, Transformers and Substations	Footprint: 3 500 m <sup>2</sup>
On-site Substation and Building	Capacity: 80 MVA Height: 30 m Footprint: 20 000 m <sup>2</sup> (maximum)
Guard Houses	Height: 3 m Footprint: 40 m <sup>2</sup>
<b>Associated Infrastructure</b>	
33 kV internal transmission lines/underground cables.	Height = 9 m if aboveground or could be underground Length: 7 500 m <sup>2</sup>
Underground low voltage cables or cable trays	Capacity: Cables 1800V (DC) and 240mm <sup>2</sup> which has a current rating of 400A in the cable tray and 440A if buried 1 m  Depth belowground: Unlikely to be buried, maximum depth of 1 m
Access Roads: Unnamed Farm Road (Widening)	Length: To be confirmed Width: More than 6 m
Access Roads: From Transnet Service Road or Unnamed Farm Road	Length: 2 000 m Width: Approximately 6 m
Internal gravel roads	Width: Approximately 4 m
Perimeter roads	Width: Approximately 2.5 m
Total Length of Internal Gravel and Perimeter Roads	Length: Approximately 20 000 m
Fencing	Type: Palisade or Mesh Height: 2.6 m to 3 m
Stormwater channels	Length: 3 000 m
Temporary work area during the construction phase (i.e. laydown area)	Footprint: Maximum 5 ha
Area occupied by both permanent and construction laydown areas (including panel maintenance and cleaning area during the operational phase).	Footprint: 20 ha (maximum)  Refer to site layout plan in Appendix J of this EIA Report. Note that the panels will be cleaned in the field during operation. Maintenance of plant equipment will be done in the workshop of the Operations and Maintenance building (and in the operations laydown area if additional space is required).
High Voltage Overhead Transmission Lines (assessed separately as part of the Basic Assessment Process)	Height = 22.5 m to 30 m Length = 4 - 9 km
Proximity to Grid Connection	Approximately 4 km (Maximum 8 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 (Chapters 7 - 15 of this finalised EIA Report).

### 2.4.1 Construction Phase

The construction phase will take place subsequent to the issuing of an Environmental Authorisation (EA) from the DEA and a successful BID in terms of the REIPPPP (i.e. the issuing of a PPA from the DOE). The construction phase for the proposed Kenhardt PV 1 project is expected to extend 14 months (however the construction period is subject to the final requirements of Eskom and the REIPPPP Request for Proposal provisions at that point in time).

As noted above, the construction phase will involve the transportation of personnel, construction material and equipment to the site, and personnel away from the 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 facilities for the appointed Contractors). The laydown area is expected to cover a maximum area of 5 ha (depending on the contracting strategy at the time). 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 EMPr, which is included in Part B of this 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 90 and 150 skilled and 400 and 460 unskilled employment opportunities are expected to be created during the construction phase. Additional details regarding the employment opportunities are provided in the Social Impact Assessment (Chapter 13 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 cleared vegetation;
- 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**

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The proposed Kenhardt PV 1 project is expected to become operational by 2018. 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 facility, including washing of panels (as explained in Section 2.3.2.4).

The projected operations are expected to provide several services and added economic spin offs (as highlighted in Chapter 1 of this EIA Report). The solar 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. Approximately 20 skilled and 40 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 Social Impact Assessment (Chapter 13 of this EIA Report).

### **2.4.3 Decommissioning Phase**

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The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and the site will be rehabilitated and returned to its pre-construction state.

If the site is not decommissioned, it is possible that a lease extension could be granted based on agreements with the landowner, as well as a renewed PPA. If this occurs, the site and technologies could possibly be advanced and upgraded, subject to the legislative requirements at that point in time.

# EIA REPORT



## CHAPTER 3:

### Description of the Affected Environment

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

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## 3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

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This chapter of the finalised EIA Report provides a broad overview of the affected environment for the proposed Kenhardt PV 1 project and the surrounding region. The receiving environment is understood to include biophysical, socio-economic and heritage aspects which could be affected by the proposed development or which in turn might impact on the proposed development.

This information is provided to identify the potential issues and impacts of the proposed project 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;
- 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 Mgqawu District Municipality IDPs and the Northern Cape PSDF.

It is important to note that this chapter intends to provide a broad overview and does not represent a detailed environmental study. Detailed descriptions of the preferred project site (Kenhardt PV 1) focused on significant environmental aspects of this project are provided in the relevant specialist studies (which are included in Chapters 7 to 15 of this finalised EIA Report). Refer to the finalised Scoping Report (CSIR, 2015) for a general description of the alternative site (i.e. Kenhardt PV 1b) that was considered during the Scoping Phase (however not assessed during the EIA Phase).

### 3.1 Background

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The proposed project is situated on the remaining extent of Onder Rugzeer Farm 168. The total farm property covers approximately 5552 ha in area and the preferred site will extend approximately 250 ha for Kenhardt PV 1. If all three solar PV projects proceed, only 13.5 % of the total farm area will be developed on. As previously noted, the site is located approximately 30 km north-east of Kenhardt, in the ZF Mgqawu 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 Table 2.1 of Chapter 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

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Figure 3.2 represents the regional setting of the proposed Kenhardt PV 1 project in terms of the surrounding sensitive ecosystem features and sensitive geographical areas (as indicated in Listing Notice 3 of the 2014 EIA Regulations) in proximity to the site. Figure 3.2 includes the Geographic Information System (GIS) information required by the DEA solar energy EIAs.

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 113 km away from the proposed project site. This information has been confirmed in the Ecological Impact Assessment (Chapter 7 of this EIA Report). An Ecological Support Area (i.e. a buffer around the Hartbees River) is located approximately 14 km west of proposed project as part of the Namakwa District Biodiversity Sector Plan. There is no conservation plan for the !Kheis Local Municipality and the ZF Mgqawu 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 3.2 shows the rivers that flow through the remaining extent of Onder Rugzeer Farm 168. These rivers are “Rugseers”, “Rooiput se Leegte” and “Wolfskop se Loop”. However, these rivers are classed as not/least threatened. Refer to the Ecological Impact Assessment (included in Chapter 7

of this EIA Report) for additional details regarding terrestrial and aquatic ecological sensitive features.

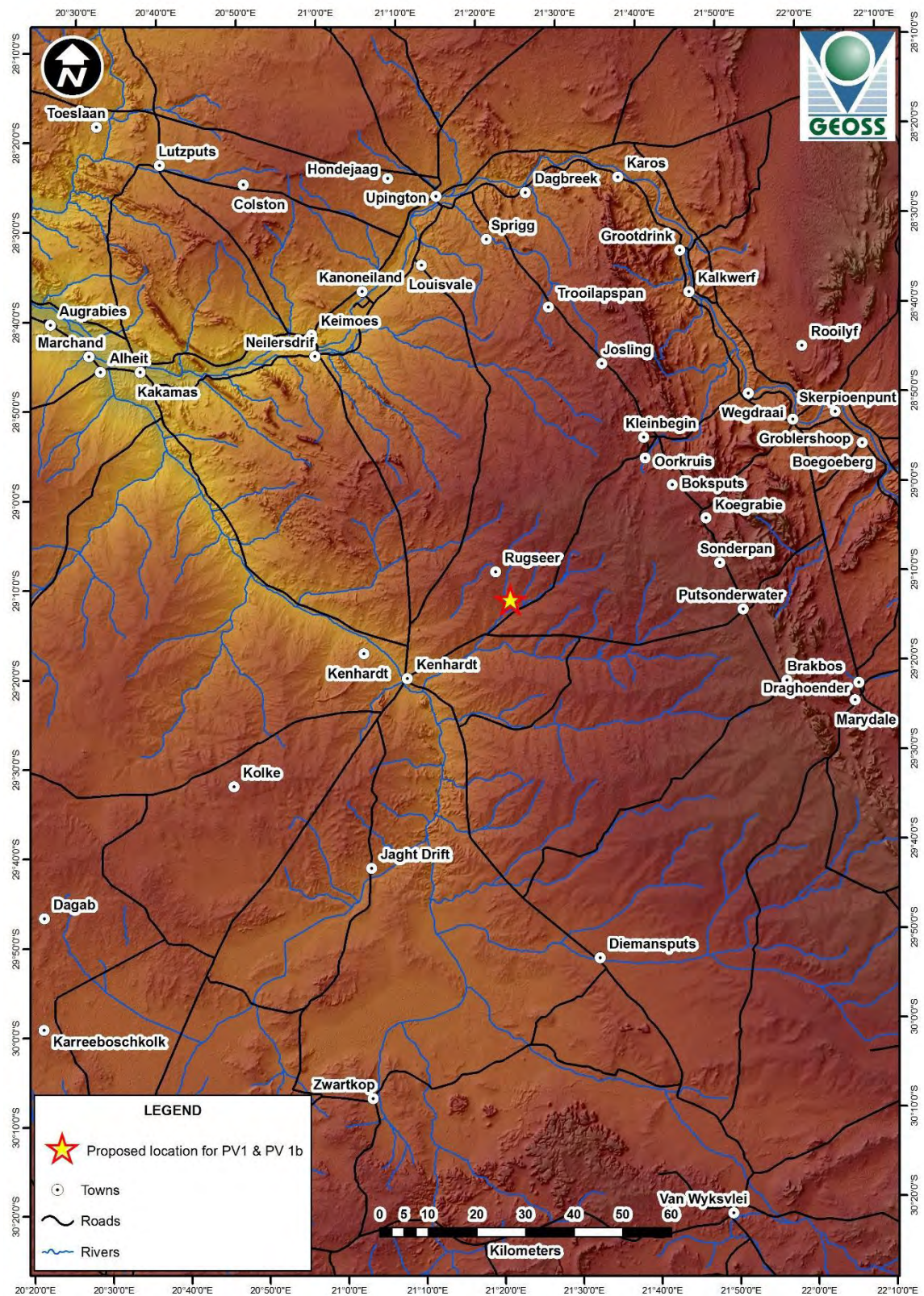


Figure 3.1: Locality Map for the proposed Kenhardt PV 1 Project within a Regional Setting (GEOSS, 2015)

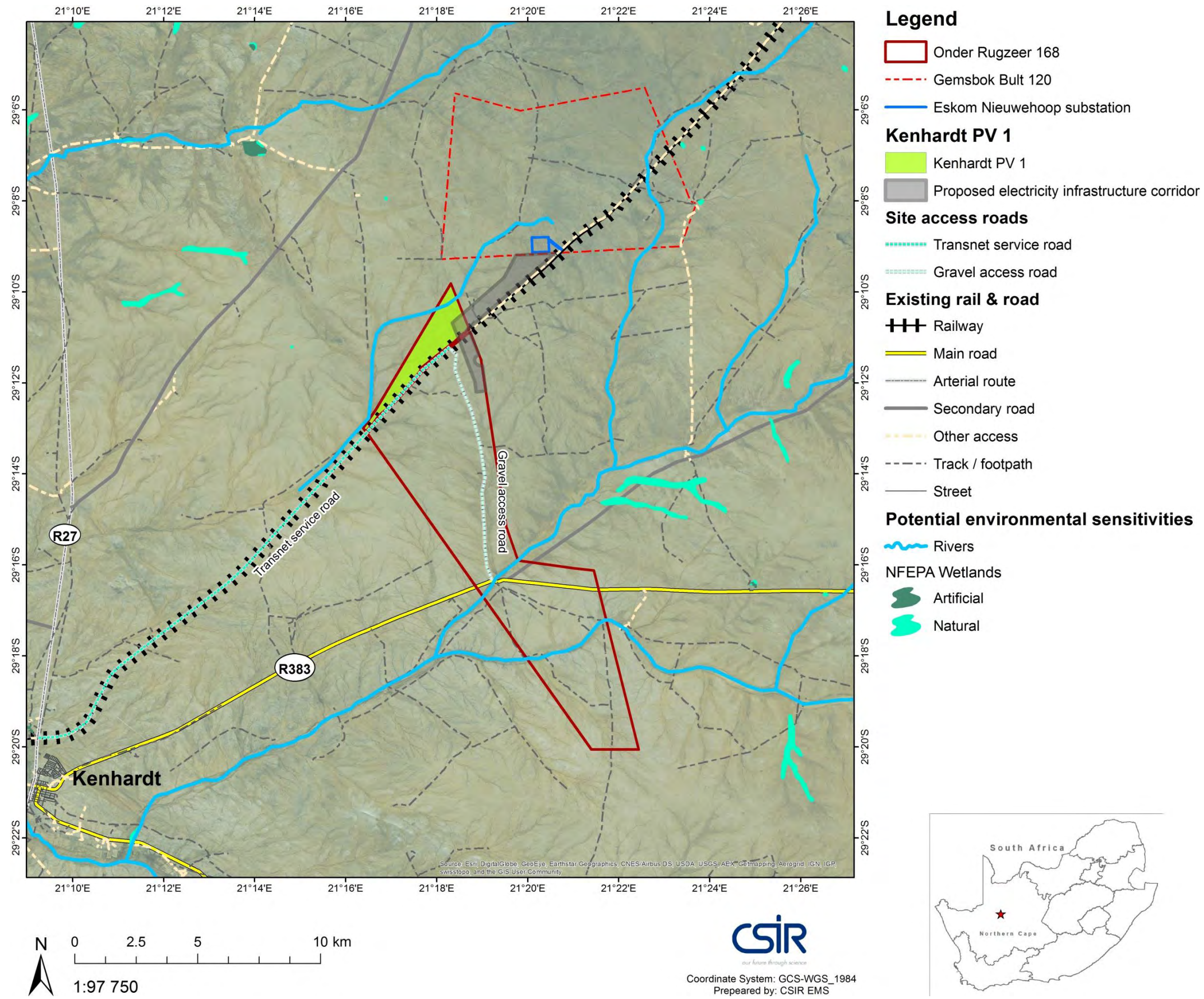


Figure 3.2: Sensitivity Map for the proposed Kenhardt PV 1 project (including the electrical corridor which has been assessed in a separate Basic Assessment Process)

### 3.3 Biophysical Environment

#### 3.3.1 Climatic Conditions

The mean annual rainfall of South Africa is shown in Figure 3.3 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 mm to 400 mm per year. Evaporation levels within this province exceed the annual rainfall. Climate conditions are extreme (i.e. very cold in winter and extremely hot in summer).

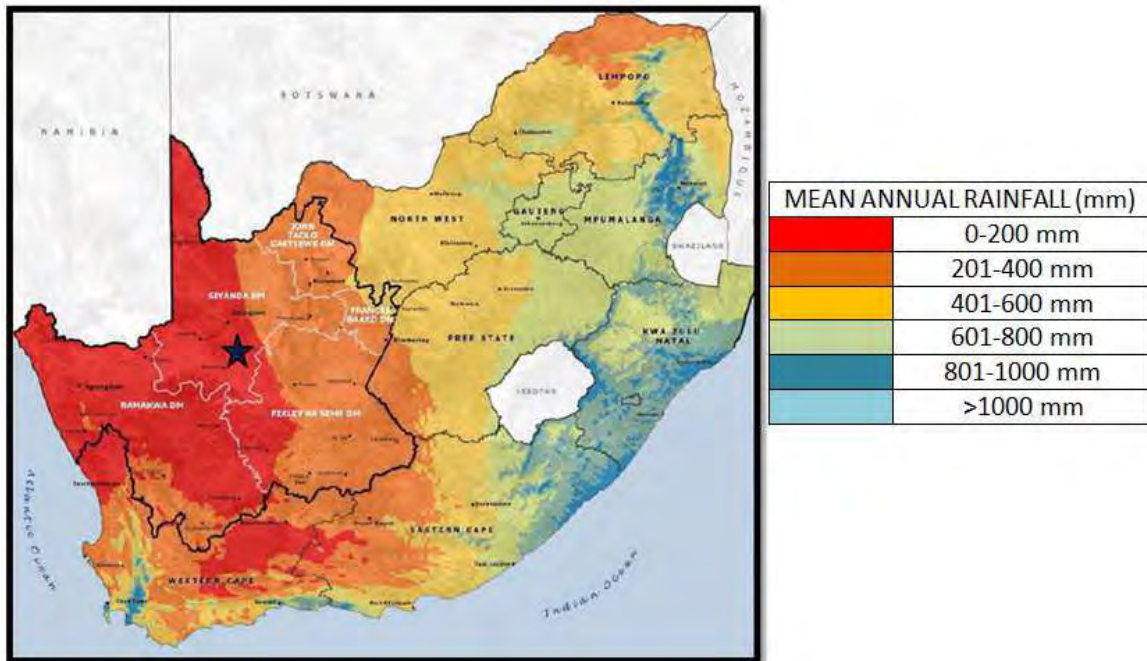


Figure 3.3: Mean Annual Rainfall Levels of South Africa (Source: Northern Cape PSDF, 2012)

The Kenhardt area (in which the proposed projects 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)<sup>1</sup>. The average monthly distribution of rainfall is shown in Table 3.1.

Table 3.1: Average Monthly Rainfall (mm) for the Kenhardt area (Water Research Commission, undated)

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

Most rainfall in Kenhardt occurs mainly during autumn. Figure 3.4 (a) shows the average rainfall values for Kenhardt per month. It typically receives the lowest rainfall (0mm) in June and the highest (23mm) in March (GEOSS, 2015).

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

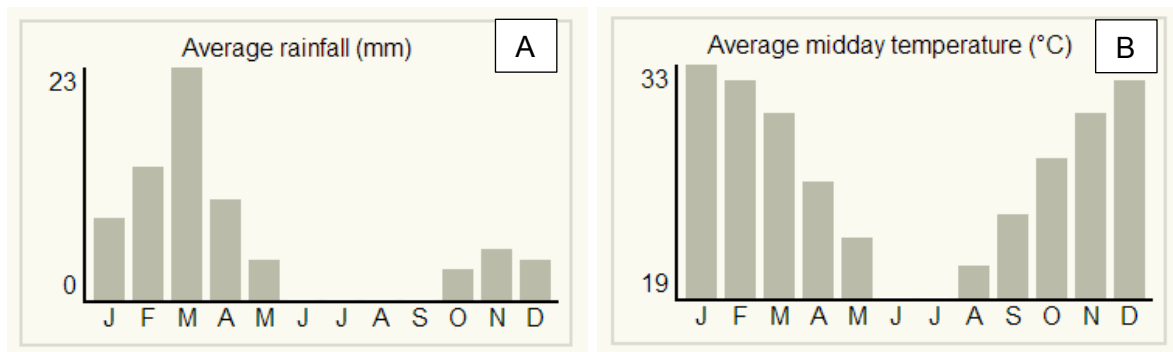


Figure 3.4: a) Rainfall and b) Average Midday Temperature for Kenhardt (www.saexplorer.co.za in GEOSS, 2015)

The monthly distribution of rainfall and evaporation for the remaining extent of Onder Rugzeer Farm 168 is shown in Figure 3.5. Since the area receives most of its rainfall during autumn it has a semi-arid to arid climate (as noted above). The relevance of this information is that the rainfall occurs whilst temperatures are quite high still and associated evaporation rates will be high. This implies that groundwater recharge will be very low. Figure 3.5 shows the long term monthly rainfall and evaporation distribution respectively (GEOSS, 2015).

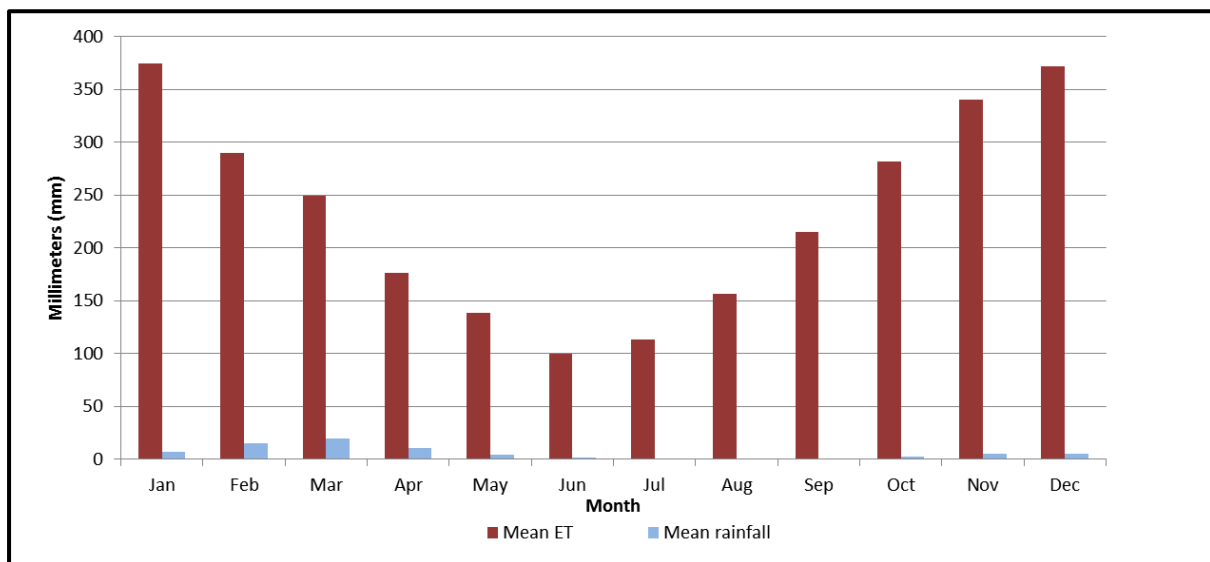


Figure 3.5: Long Term Average Rainfall and Evaporation (Schulze et al., 2008 in GEOSS, 2015)

Figure 3.6 shows the average monthly climatic chart for Kenhardt<sup>2</sup>. As shown in Figure 3.6, 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 monthly distribution of average daily maximum temperatures (Figure 3.4 (b)) shows that the average midday temperatures for Upington range from 19 °C in June to 33 °C in January (GEOSS, 2015).

The average daily solar radiation levels in South Africa range between 4.5 and 6.5 kilowatt-hour per square meter (kWh/m<sup>2</sup>). In South Africa the measured solar radiation is the highest in the Northern Cape, North West Province and the Free State. As discussed in Chapter 2 and Chapter 5 of this EIA Report and shown in Figure 5.4, the site was selected because of the high solar radiation levels of the area (2300 kWh/m<sup>2</sup> per annum or 6.3 kWh/m<sup>2</sup> per day).

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

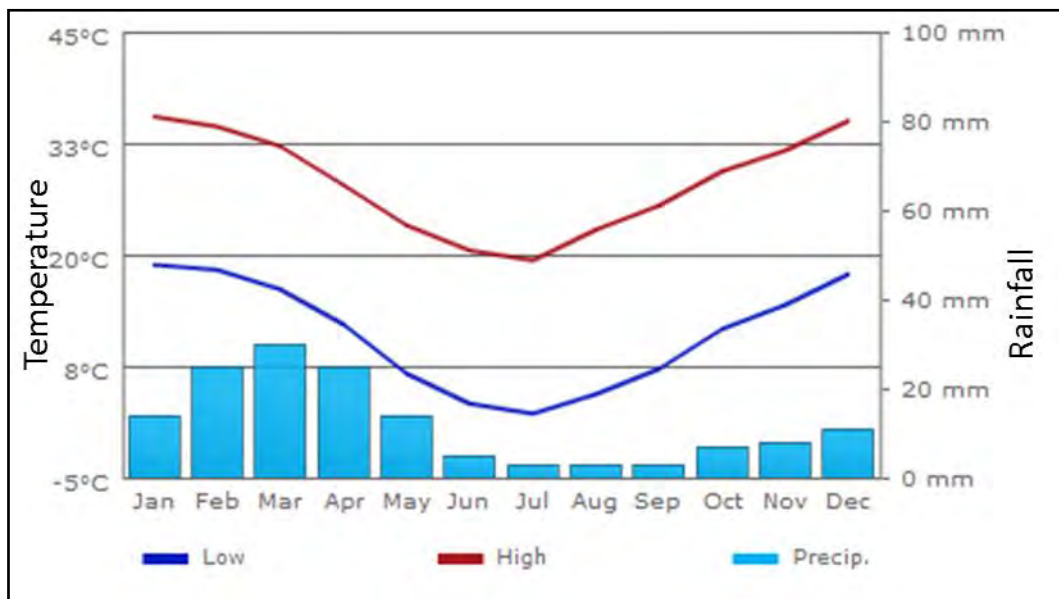


Figure 3.6: Climate chart for Kenhardt showing the monthly maximum and minimum temperatures (lines) and the average rainfall (bars) (Source: Climatedata)

One of the most important climate parameters for agriculture in a South African context is moisture availability, which is the ratio of rainfall to evapotranspiration. Moisture availability is classified into 6 categories across the country (as shown in Table 3.2). The proposed development site falls within class 6 which is described as a very severe limitation to agriculture (Lanz, 2015).

Table 3.2: The classification of moisture availability climate classes for summer rainfall areas across South Africa (Agricultural Research Council, Undated)

Climate class	Moisture availability (Rainfall/0.25 PET)	Description of agricultural limitation
C1	>34	None to slight
C2	27-34	Slight
C3	19-26	Moderate
C4	12-18	Moderate to severe
C5	6-12	Severe
C6	<6	Very severe

The specialist studies included in Chapters 7 to 15 of this EIA Report provide additional details regarding the climatic conditions on site.

### 3.3.2 Topography and Landscape

The topography of the region is flat with gentle, open undulations (West-East elevations ranging between 936 m and 1000 m, and North-South elevations ranging between 895 m and 1018 m (Holland, 2015)). 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).

Furthermore, the proposed development site lies across a low ridge that effectively bisects the area into two watersheds (SDP, 2015). Some shallow depressions are also evident arising from the variable sandy ridges that overlie the sandstone - dolerite geology of the area (SDP, 2015). Slopes across the site are almost entirely less than 2% with slightly steeper relief in some isolated spots (Lanz, 2015).

The Kenhardt landscape is arid with brown sand occurring widely being occasionally interspersed with black boulders. Because of the lack of trees in the area, a large number of weaver birds make use of the telegraph poles along the road to build their community nests (GEOSS, 2015).

A description of the geology and vegetation of the region is respectively provided in Section 3.3.3 and Section 3.3.8 of this chapter.

Detailed descriptions of the topography and landscape of the Kenhardt PV 1 site and surrounding regions are provided in the Ecological Impact Assessment (Chapter 7), Visual Impact Assessment (Chapter 8) and Heritage Impact Assessment (Chapter 9).

### 3.3.3 Regional Geology

The Geological Survey of South Africa (now the Council for Geoscience) has mapped the area at 1:250 000 scale (2920 - Kenhardt). The main geology of the area is listed in Table 3.3. The formations occurring within the study area are indicated in bold (and shaded) in Table 3.3 (GEOSS, 2015).

**Table 3.3: Geological Formations within the Study Area**

Symbol	Name	Group	Description
<b>Qg</b>	<b>Gordina Formation</b>	<b>Kalahari</b>	<b>Wind-blown dunes</b>
<b>Mks</b>	<b>Klip koppies granite</b>	<b>Keimoes suite</b>	<b>Grey, fine to medium grained porphyritic granite</b>
Mb	Brussel granite		Grey, fine to medium grained porphyritic granite
Me	Elsie se gorja granite		Grey, medium grained granite, well-foliated.
Mva	Valsvei	Biesje poort	Yellow weathered, medium grained quartzitic gneiss with lenses of calc-silicate pelitic gneiss
Msa	Sandputs		Grey to brown, fine grained weather calc-bearing quartzite
<b>Mja</b>	<b>Jacomyns pan</b>	<b>Jacomyns pan</b>	<b>Pelitic gneisses with quartzite, leuco-gneiss, amphibolite and calc-silicate rocks.</b>
Mke	Kenhardt migmatiet	Metamorphic suite	Migmatitic biotite gneiss, amphibolite, leucogneiss and porphyroblastic biotite.

The oldest rocks in the area comprise of metamorphic gneisses (altered granite) which belong to the Jacomyns Pan Formation (Mja). The Jacomyns Pan Formation is also part of the Jacomyns Pan Group. These rocks mainly occur in the northern and central portion of the study area and are



presumed to be bedrock. The stream channels are filled with alluvial material (Slabbert *et al*, 1999).

Two structural features are indicated as faults on the map sheet trend in a north-west to south-east direction. The structural features intersect the study area for Kenhardt PV 1 on the south-west border (GEOSS, 2015).

A detailed description of the geology of the region is provided in the Palaeontological Impact Assessment (Chapter 10) and the Geohydrological Assessment (Chapter 11) of this EIA Report.

### **3.3.4 Soil Types and Soil Potential**

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All the information on soils and agricultural potential in this chapter has been obtained from the online AGIS, produced by the Institute of Soil, Climate and Water (Agricultural Research Council, undated). A detailed description of the soil types and soil potential within the region is provided in the Soils and Agricultural Potential Assessment (Chapter 12 of this EIA Report).

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. The general area of Onder Rugzeer Farm 168 is located on two land types, Ag6 in the north and the very similar Ag2 in the south. As noted in the Soils and Agricultural Potential Assessment (Chapter 12 of this EIA Report), the preferred project site (i.e. Kenhardt PV 1) is located on land type Ag6 only. 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 Appendix 12.1 of the Soils and Agricultural Potential Assessment (Chapter 12 of this finalised EIA Report). As noted in the Soils and Agricultural Potential Assessment, the land has a low to moderate water erosion hazard, mainly due to the low slope, but it is susceptible to wind erosion because of the sandy texture of the soil (Lanz, 2015).

### **3.3.5 Agricultural Capability and Sensitivity**

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A detailed description of the agricultural capability and sensitivity within the region is provided in the Soils and Agricultural Potential Assessment (Chapter 12 of this EIA Report).

As noted in the Soils and Agricultural Potential Assessment, land capability is the combination of soil suitability and climate factors. The area has a land capability classification, on the 8 category scale, of Class 7 - non-arable, low potential grazing land. The limitations to agriculture are aridity and lack of access to water plus 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 (Lanz, 2015).

In terms of agricultural sensitivity, the farm is located within a sheep farming agricultural region and there is no cultivation on the farm. Agricultural potential is uniformly low across the farm. No agriculturally sensitive areas occur within the site.

### **3.3.6 Regional Hydrogeology**

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A detailed description of the regional hydrogeology of the region is provided in the Geohydrological Assessment (Chapter 11) of this EIA Report. According to the 1:500 000 scale groundwater map of Prieska (2920) the entire study area does host an “intergranular and fractured” aquifer (i.e. wind-blown sands and river alluvium as well as fractures within the bedrock constituting the aquifer) with an average borehole yield of 0.1 L/s to 0.5 L/s (DWAf, 2002)(GEOSS, 2015). This is indicated in Map 4 in Appendix 11.A of the Geohydrological Assessment (Chapter 11 of this finalised EIA Report).

With such low rainfall in the area, and thus associated low groundwater recharge conditions, it is anticipated that the groundwater quality will be poor. The regional 1:500 000 groundwater quality map (shown in Map 5 in Appendix 11.A of the Geohydrological Assessment (Chapter 11 of this finalised EIA Report)), indicates that the groundwater quality in the southern portions of the region will be of relatively better groundwater quality than the northern portion. Using Electrical Conductivity (EC) as a groundwater quality indicator, the EC ranges from 300 - 1 000 milliSiemens per meter (mS/m), in the Kenhardt PV 1 area. In terms of domestic supply this is classified as “poor” and “completely unacceptable”. It cannot be used for irrigation (unless very salt tolerant plants are cultivated) or for the washing down of solar panels as it will most probably leave a salty deposit on the panels (as also noted in Chapter 2 of this EIA Report) (GEOSS, 2015).

The national scale groundwater vulnerability map, which was developed according to the DRASTIC methodology (DWAF, 2005), classifies the area as having a “medium” vulnerability to surface based contaminants (as shown in Map 6 in Appendix 11.A of the Geohydrological Assessment (Chapter 11 of this finalised EIA Report)).

However this assessment is based on national scale mapping. Based on the local conditions at the study area there is a very low risk of groundwater contamination in this area as the groundwater level is relatively deep (GEOSS, 2015).

### ***3.3.7 Existing Groundwater Data***

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A search was completed of the National Groundwater Archive database which provides data on borehole positions, groundwater chemistry and borehole yield for the study area. During the Scoping Phase, a 1 km search radius was used for the Kenhardt PV 1 around the boundaries. The National Groundwater Archive database indicated no boreholes within the 1 km search radius (GEOSS, 2015).

In November 2014, GEOSS conducted a hydrocensus on the adjacent farm Boven Rugzeer Remaining Extent of 169 and during the field hydrocensus the locations of the 10 boreholes were identified within the farm portion and three were found within the Transnet servitude (GEOSS, 2015).

The hydrocensus boreholes were found to be dry or to have very low yields (GEOSS, 2014). Relevant information regarding borehole yields, borehole and groundwater depths and groundwater quality was also obtained from the land owner. It has been reported that borehole depths are typically between 60 - 120 m deep and fractures occur within the highly metamorphic rocks between two zones of 15 - 30 m and 100 - 120 m below ground level (GEOSS, 2015).

A summary of hydrocensus boreholes and their field chemistry can be found in Table 3.4.

The hydrocensus revealed that the potential for groundwater use within the area is very limited and of poor quality and saline. The total dissolved solids within the study area range from 1 200 - 7 780 mg/L and salinity has a range of 840 - 4 700 mg/L. Groundwater is primarily used for livestock watering and domestic use to a limited extent.

Overall, the proposed site for the proposed solar PV project will have a minimal effect on the geohydrology of the area. The study area is located in a highly metamorphic geological setting. Metamorphic rocks rarely produce sufficient groundwater and are considered an effective barrier to groundwater flow. The poor potential for groundwater development is related to the low occurrence of fractured networks within the formations.

A detailed description of the regional groundwater and the vulnerability to surface based contamination is provided in the Geohydrological Assessment (Chapter 11) of this EIA Report.

**Table 3.4: Hydrocensus Boreholes (11 - 13 November 2014)**

Location	Latitude (WGS84)	Longitude (WGS84)	WL (mbch)	CH (m)	WL (mbgl)	pH	Temp. (°C)	ORP (mV)	EC (mS/m)	TDS (mg/L)	Salinity (mg/L)	Comment
HBH1	-29.2185	21.3701	19.506	0.37	19.136	7.32	17.3	-18	876	7 780	4 700	Low yield ~0.04 L/s
HBH2	-29.2048	21.39401	-	-	-	7.80	25	-	338	1 951	-	No access point for WL
HBH3	-29.1600	21.33626	43	0.3	42.7	-	-	-	-	-	-	Dry, water from seep
HBH4	-29.1226	21.37785	-	-	-	-	-	-	-	-	-	1.2 L/s Transnet BH
HBH5	-29.1233	21.37715	-	-	-	-	-	-	-	-	-	0.6 L/s Transnet BH
HBH6	-29.1498	21.37715	-	-	-	-	-	-	-	-	-	Dry
HBH7	-29.1498	21.31763	-	-	-	7.28	17.4	-17	563	4 320	2 960	0.08 L/s sampled from reservoir
HBH8	-29.1177	21.3320	-	-	-	7.16	17.5	-10	537	4 110	2 840	0.1 L/s, sampled from reservoir
HBH9	-29.1833	21.33219	-	-	-	7.29	17.6	-10	228	1 680	1 150	Low yield - windpump
HBH10	-29.1489	21.32297	-	-	-	-	-	-	-	-	-	Dry
HBH11	-29.1542	21.3288	-	-	-	-	-	-	-	-	-	Dry
HBH12	29.11688	21.3775	-	-	-	7.7	17.4	-43	168	1 200	840	0.13 L/s windpump no WL access
HBH13	-29.1441	21.35368	-	-	-	-	-	-	-	-	-	Dry

HBH = hydrocensus borehole

WL = water level

CH = collar height

Temp = temperature

ORP = oxygen reduction potential

EC = electrical conductivity

TDS = total dissolved solids

mbch = metres below collar height

m = metres

mV = milliVolts

mS/m = milliSiemens per metre

mg/L = milligrams per metre

mbgl = metres below ground level

### 3.3.8 Aquatic and Terrestrial Environment

The SANBI BGIS has been used to define the regional vegetation, water resources, faunal and avifaunal and anticipated ecological sensitivity of the study area. A literature review of existing reports, scientific studies, databases, reference works, guidelines and legislation relevant to the study area was conducted to establish the baseline ecological and vegetative condition of the site and associated environment. Details pertaining to the aquatic and terrestrial environment are provided in the Ecological Impact Assessment specialist study (which is included in Chapter 7 of this EIA Report).

#### 3.3.8.1 Aquatic Environment (Surface Water, Drainage, and Wetland Ecosystems)

The Northern Cape is divided into the following four Water Management Areas:

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

The proposed development area falls within the Lower Orange Water Management Area. 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 National Freshwater Ecosystems Protected Areas (NFEPA) project earmarked several important catchments (sub-quaternaries) based either on the presence of important biota (e.g. rare or endemic fish species) or the degree or lack thereof with regard to riverine degradation, i.e. the greater the catchment degradation the lower the priority to conserve the catchment. The important catchments areas are then classified as Freshwater Ecosystem Protection Areas (FEPAs). No FEPAs are located within the study area or immediately downstream of the study area (SDP, 2015).

Figure 3.7 shows the surface water and drainage associated with the site and the FEPAs in the greater region. A number of surface water drainage features are associated with the development area and these major and minor drainage lines are described in the Ecological Impact Assessment (Chapter 7 of this EIA Report).

Desktop research undertaken by Colloty (2014) for an adjacent proposed solar PV project indicates that the area falls within two quaternary catchments namely D53C and D53B of the Hartbees River. Several main stem rivers are found within these catchments. These tributaries include:

- Rugseers;
- Rooiput se Leegte;
- Nrougas se Loop; and
- Several unknown tributaries.

As shown in Figure 3.2 above, three river systems flow through the remaining extent of the Onder Rugzeer Farm 168 (the project site), which include the Rugseers, Wolfkop se Loop and the Rooiput se Leegte (which is a tributary of the Rugseers river), which lead to the Hartbees River. Drainage consists mainly of dry or ephemeral water courses and the major water courses are tributaries of the Orange River (Holland, 2015). A description of the surface water features that fall within the Kenhardt PV 1 project area is provided in detail in the Ecological Impact Assessment specialist study (Chapter 7 of this EIA Report).

From an aquatic vegetation point of view, the general area is dominated by species associated with the Nama Karoo (Bushmanland Arid Grassland) vegetation ecosystem. 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).

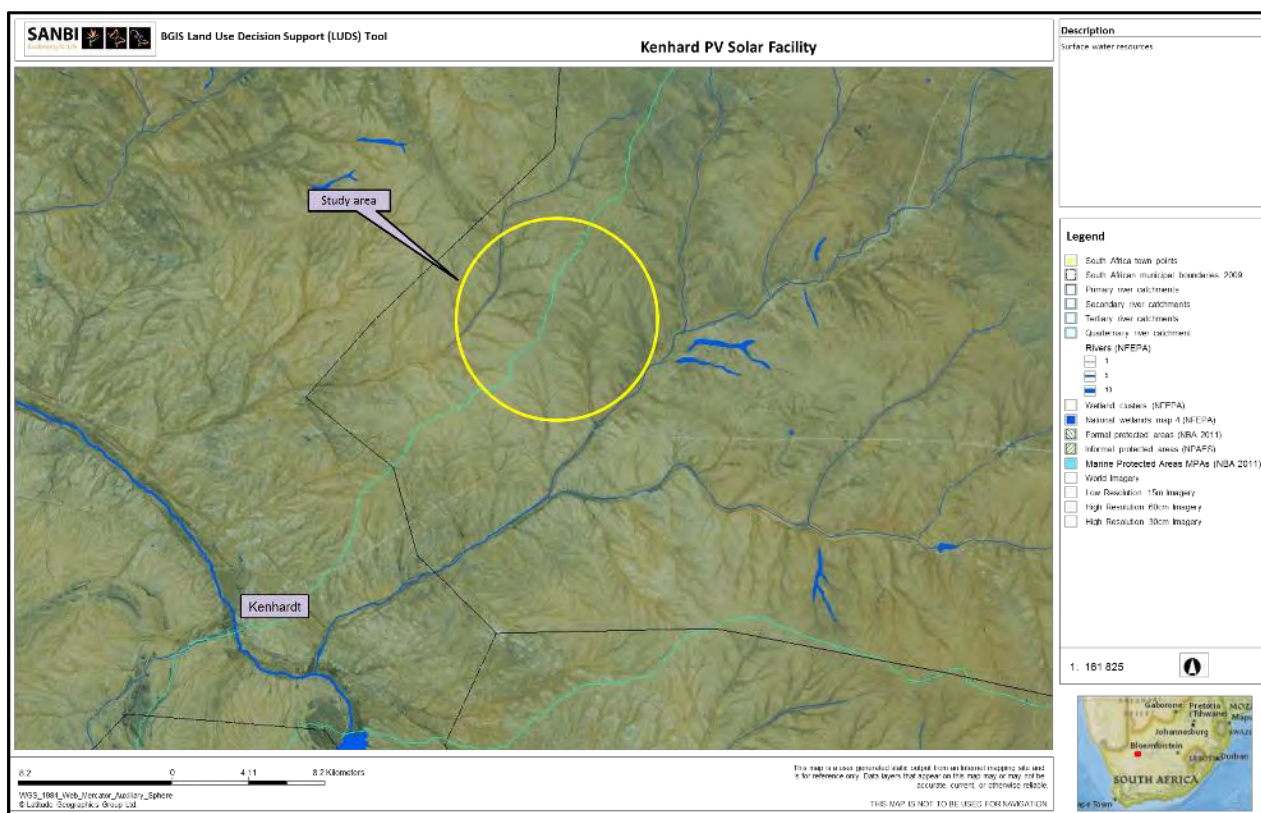


Figure 3.7: Surface Water Drainage and Wetlands (DWA and SANBI, 2015)

### 3.3.9 Terrestrial Environment

#### 3.3.9.1 General Vegetation Description

The study area is located in the Nama Karoo biome of South Africa. The site falls within the Bushmanland Arid Grassland (Nkb3) vegetation type (Mucina and Rutherford 2006). This vegetation unit is the second most extensive vegetation type in South Africa extending from around Aggeneys in the east to Prieska in the west. It is associated with freely draining alkaline soils common to this area. This vegetation form comprises, under a natural state, primarily of arid grassland dominated by *Aristida spp* and *Stipagrostis spp* (SDP, 2015).

More than 99% of the original extent of the vegetation type is considered to be remaining intact and as a consequence, its' conservation status is classified as "least threatened" (i.e. this vegetation type is not listed as Threatened Ecosystems under the NEMBA). Mucina and Rutherford (2006) list 6 endemic species for this vegetation type, namely the succulent shrubs *Dinteranthus pole-evansii*, *Larryleachia dinteri*, *L marlothi*, *Ruschia kenhardtensis* and herbs *Lotononis oligocephala* and *Nemesia maxi*. A biogeographically important taxon is *Tridentea dwequensis* (SDP, 2015).

A detailed description of the terrestrial habitat and vegetation that fall within the Kenhardt PV 1 project area is provided in the Ecological Impact Assessment specialist study (Chapter 7 of this EIA Report).

### 3.3.9.2 Fauna

The fauna that can be expected in the study area (as determined from known distribution records and other studies) are presented in Table 3.5.

**Table 3.5: List of Species likely to occur in the Study Area**

Common Name	Species Name	Red Data List Category
<b>Mammals</b>		
Black-backed Jackal	<i>Canis mesomelas</i>	Least concern
Bat eared fox	<i>Otocyon megalotis</i>	Least concern
Namaqua Rock Mouse	<i>Aethomys namaquensis</i>	Least concern
Large spotted gennet	<i>Genetta tigrina</i>	Least concern
<b>Amphibians</b>		
Tremelo Sand Frog	<i>Tomopterna cryptotis</i>	Least Concern
<b>Reptiles</b>		
Verreaux's Tent Tortoise	<i>Psammobates tentorius</i>	Not listed
Southern Rock Agama	<i>Agama atra</i>	Least concern
Variegated Skink	<i>Trachylepis variegata</i>	Least concern

Very few signs of animal activities were noted during the surveys conducted by Envirolution Consulting in November 2013 for the updating of the Eskom Nieuwehoop Substation Construction and Operational Environmental Management Programme (COEMPr)<sup>3</sup>. Evidence was limited to small mammals such as Cape Ground Squirrel (*Xerus inauris*) and runways of the Striped mouse (*Rabdomys pumilio*). As shown in Table 3.5 above, additional species are expected in the greater study area, which has been surveyed during the EIA Phase. The Ecological Impact Assessment specialist study (Chapter 7 of this EIA Report) provides a detailed list of species or evidence of their presence observed on site (during the specialist site visit), as well as the species that are likely to be encountered on site.

### 3.3.9.3 Avifauna

According to the South African Bird Atlas Project (SABAP2), an average of 182 bird species has been recorded in the greater study area. The study area does not fall within or in close proximity to any Important Birds Areas (IBAs), with the closest being the Augrabies Falls National Park, located over 100 km to the north west of the study area (SDP, 2015). The Ecological Impact Assessment specialist study (Chapter 7 of this EIA Report) provides additional information on avifauna, as well as a detailed list of species observed on site (during the specialist site visit).

## 3.3.10 Protected Areas

As noted in Section 3.2 above, the site does not fall within any protected areas defined in the NPAES or South African National Parks (NBA). There are no formal protected areas within 20 km of the proposed site (SDP, 2015). The closest NPAESs are the Gariiep NPAES, located 30km to the south-east of the site and the Kamiesberg Bushmanland Augrabies NPAES located 43 km north-west of the site. The Augrabies Falls National Park is approximately 115 km north-west of the site.

## 3.3.11 Heritage Profile

### 3.3.11.1 Palaeontology

The study area for the proposed Kenhardt PV 1 project, located on the Farm Onder Rugzeer 168, is situated within the semi-arid Bushmanland region between c. 950 to 900 m above mean sea level (amsl), with a general slope towards the south. It is drained by a dendritic network of shallow,

<sup>3</sup> Report sourced from: [mp2mas17.eskom.co.za/tenderbulletin/File\\_Show.asp?ID=89791](http://mp2mas17.eskom.co.za/tenderbulletin/File_Show.asp?ID=89791)

southwest-flowing tributary streams of the Hartbeesrivier, such as the Rugseersrivier in the south and the Wolfkop se Loop in the north (Almond, 2015).

The geology of the study area is shown on 1: 250 000 geology sheet 2920 Kenhardt (Council for Geoscience, Pretoria) (Figure 3.8). 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 NW-SE trending fault zone and lie to the north of the major Wolfkop Fault. A large proportion 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 - especially - Quaternary to Recent aeolian (wind-blown) sands of the Gordonia Formation (Kalahari Group). 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 (Almond, 2015). The PV 1 study area (Figure 3.8, orange) is underlain by Precambrian basement rocks of the Jacomyns Pan Group and the Keimoes Suite. The basement rocks are largely mantled by aeolian sands of the Gordonia Formation as well as Late Caenozoic alluvial deposits (Almond, 2015).

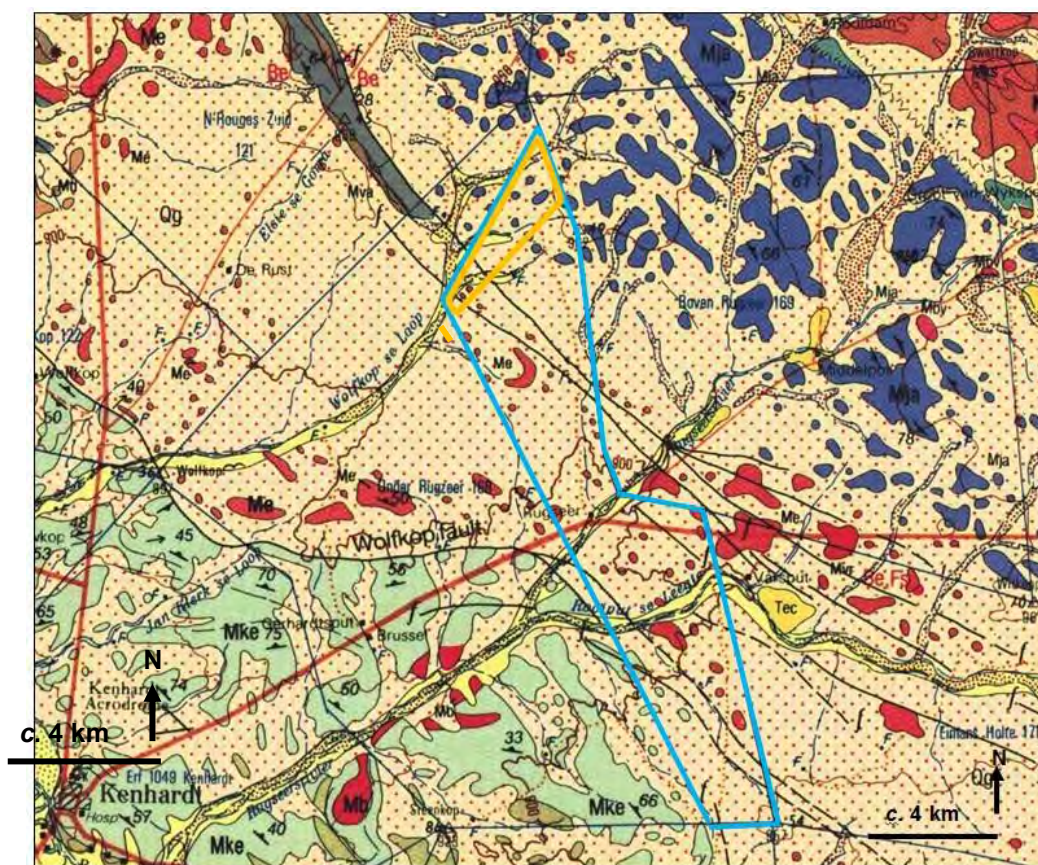


Figure 3.8: Extract from 1: 250 000 scale geological map sheet 2920 Kenhardt (Council for Geoscience, Pretoria) showing the geology of the Scatec Solar PV Facilities study area on Farm Onder Rugzeer 168 (outlined in blue) situated to the NE of Kenhardt, Northern Cape. The PV 1 study site is approximately indicated by the orange polygon in the north (Almond, 2015)

The main geological units represented within the broader study region include (Almond, 2015):

#### **Precambrian Basement Rocks**

- Keimoes Suite
  - Red (Me) = Elsie se Gorra Granite
- Korannaland Supergroup
  - Brown (Mva) = Valsvlei Formation, Biesje Poort Group
  - Grey (Msa) = Sandputs Formation, Biesje Poort Group
  - Blue (Mja) = Sandnoute Formation, Jacomyns Pan Group
- Vyfbeker Metamorphic Suite
  - Pale blue-green (Mke) = Kenhardt Migmatite

#### **Late Caenozoic Superficial Sediments**

- Pale yellow with sparse red stipple (Qg) = aeolian sands of the Gordonia Formation (Kalahari Group)
- Pale yellow with dense red stipple = alluvial and pan sediments
- Dark yellow (Tec) = calcrete

A detailed description of the palaeontological features within the study area, along with associated potential impacts of the proposed project, is included in the Palaeontological Impact Assessment (Chapter 10) of this EIA Report.

#### **3.3.11.2 Archaeology**

A detailed description of the archaeological features within the study area is included in the Heritage Impact Assessment (Chapter 9) of this EIA Report.

In common with much of Bushmanland, the project area is a flat expanse of relatively flat terrain but with many ephemeral drainage lines visible on aerial photography. Previous work in the area (Orton 2014a, 2014b, 2014c) suggests that vegetation cover is likely to be very sparse with the ground surface openly visible at all times. Aside from the ephemeral stream lines, Kenhardt PV 1 and Kenhardt PV 3 all appear to be free of other landscape features. Kenhardt PV 2 contains a small pan in the north, close to the railway line, while a small rocky outcrop lies just outside and to the east of the layout area (ASHA Consulting, 2015).

In terms of expected heritage resources, 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 immediately east of the present site suggests that such dense accumulations of artefacts are unlikely to occur in this area (ASHA Consulting, 2015).

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 to the east of the present study area in association with pans but artefact scatters associated with drainage lines were rare (Orton 2014a, 2014b, 2014c). The drainage lines on the present site, however, are more prominent and perhaps more likely to reveal LSA camp sites. 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. Similar LSA sites can also be found in association with rocky outcrops but none appear to occur within the present study area. 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. Despite the increased likelihood of locating archaeology along streams, Morris (2009) noted that a search along the banks of the Hartebees River close to Kenhardt, where he



expected elevated frequencies of archaeological material, revealed virtually nothing (ASHA Consulting, 2015).

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). In terms of protected species, 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. Based on previous research, there are two quiver tree forests located towards the north, on the Gemsbok Bult Farm (ASHA Consulting, 2015).

The built environment is sparsely represented in Bushmanland because the farms tend to be so large. The vast majority of structures appear to be quite recent in age (20th century) and are 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 (ASHA Consulting, 2015).

Although the Anglo-Boer War was fought across the Northern Cape, there is little of significance in the Kenhardt area (ASHA Consulting, 2015). The town was occupied by the Boers early on 25 February 1900 but they surrendered to the British who occupied the town on 31 March 1900 (Grobler, 2004).

### *3.3.11.3 Cultural and Natural Landscape (i.e. Visual Baseline)*

The cultural and natural landscape should also be considered in terms of heritage significance. However, 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 (ASHA Consulting, 2015).

The proposed site for the PV plant is in a remote and sparsely populated region with the nearest town, Kenhardt, more than 10 km from the site. Sheep farming is the major agricultural activity and the sites are located on sheep farming land. The Sishen-Saldanha iron ore railway line traverses the properties on which the proposed plants will be built, and passes within 5 km of the proposed solar plant sites (i.e. Kenhardt PV 1, Kenhardt PV 2, and Kenhardt PV 3). The railway line was recently renovated. The Nieuwehoop Substation, currently under construction, is located on the adjacent Remaining Extent of Portion 3 of Gemsbok Bult Farm Number 120. The cultural landscape is of low value and because of the Sishen-Saldanha Railway and the already approved Eskom Nieuwehoop Substation that will be constructed on the farm. The area therefore lends itself to an industrial character to the immediate landscape (Orton, 2014).

The R27, a major road between Cape Town and Upington, is more than 10 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, passes more than 10 km from the site and connects Kenhardt with Marydale. Based on the distance between these roads and the proposed site, it is highly unlikely to be visible to anyone other than local residents making use of the gravel road along the railway line. Solar PV facilities are not very tall and, if an earthy coloured paint is used for the buildings, they can be almost invisible from as little as 1 km away (ASHA Consulting, 2015). 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 proposed development (Holland, 2015).

### 3.3.12 Socio-Economic Environment

It must be noted that documented data on the study area, particularly in terms of area specific (i.e. Kenhardt and surrounds) socio-economic data, is very limited. Accordingly, the available data is interpreted in terms of professional opinion and generally accepted trends within the study area and South Africa.

Additional detail regarding the Socio-Economic environment is provided in the Social Impact Assessment, which is included in Chapter 13 of this EIA Report.

#### 3.3.12.1 Demographic Profile

The ZF Mgcawu 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 3.9). The ZF Mgcawu DM covers an area of approximately 100 000 km<sup>2</sup> (almost 30 % of the Province) (ZF Mgcawu DM IDP, 2014) and according to the 2011 Census has approximately 236 783 inhabitants.

The actual project footprint (Remaining Extent of Onder Rugzeer Farm 168) is located within the !Kheis Local Municipality. However, the closest urban center, Kenhardt, is located in the Kai !Garib Local Municipality.

A total of 16 703 households resides in the Kai !Garib Local Municipality, with 35 % of households being female headed. The total female population dominates the total male population by 8.5 % (Kai !Garib Draft IDP, 2014). Population of the working age demographic (i.e. 15 to 65 years) makes-up 70.5 % of the population, whereas those below 15 years of age comprise 24.4 % of the population, and the above 65 years age group makes-up 5.1 % of the population of the Kai !Garib Local Municipality. Accordingly, the dependency ratio (i.e. the economically active population vs. the non-economically active population: 24.4 % + 5.1 %) is 29.5 % (du Toit, 2015).

The !Kheis Local Municipality consists of a total of 4146 households, with 34.6 % of households being female headed. Population of the working age demographic (i.e. 15 to 65 years) makes-up 70.5 % of the population, whereas those below 15 years of age comprises 35 % of the population, and the above 65 years age group makes-up 5.1 % of the population (Statistics SA, 2015).

This data is suggestive of an area with a relatively high level of vulnerable people groups (i.e. woman and children) and, potentially, a corresponding high level of vulnerable households.

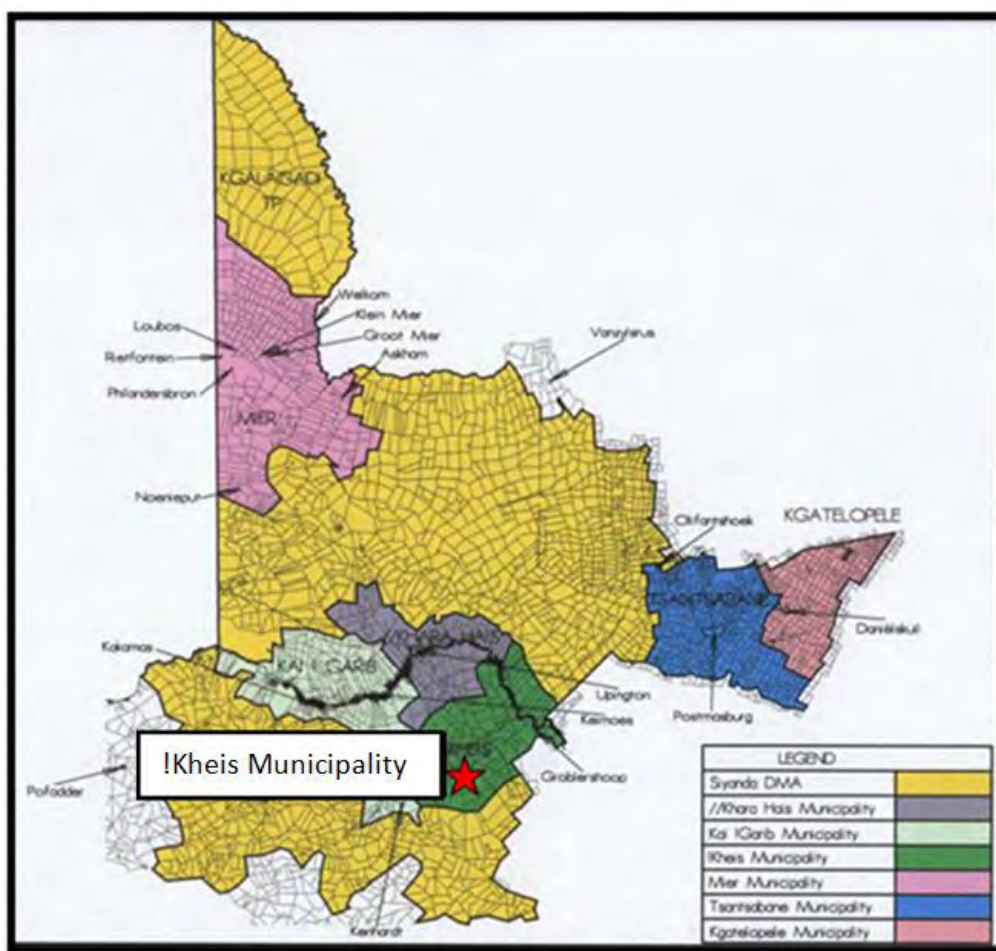


Figure 3.9: Siyanda DM (now known as ZF Mgcawu DM) boundary and boundaries of local municipalities (Siyanda DM IDP, 2013)

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 3.6, the !Kheis Local Municipality constitutes 8 % of the total population of the ZF Mgcawu DM.

Table 3.6: Population of the Local Municipalities within the ZF Mgcawu DM (Statistics SA, 2011)

Municipality	Census 2001	Census 2011	% of the total population	Difference	Area (Km <sup>2</sup> )	Persons / Km <sup>2</sup>
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
<b>Total</b>	<b>202 106</b>	<b>236 783</b>	<b>100%</b>	<b>35903</b>	<b>102520</b>	<b>2.3</b>

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 Local Municipality containing a similar racial population group composition (as shown in Figure 3.10).

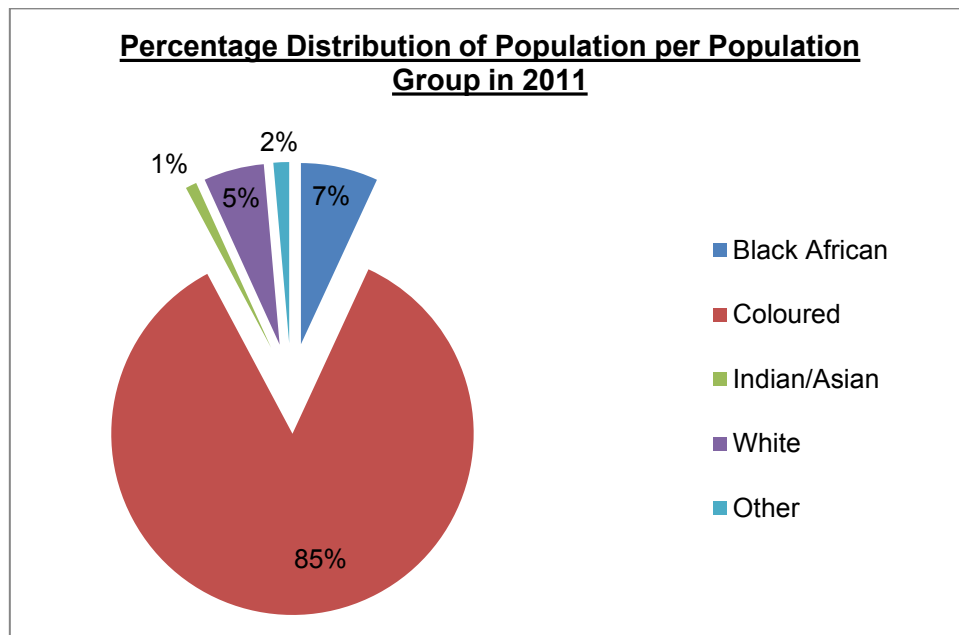


Figure 3.10: Percentage Distribution of Population per Population Group for the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

The age distribution of the ZF Mgqawu DM (shown in Figure 3.11 below) is represented by a majority of young people, i.e. persons younger than 40 years old (Statistics SA, 2011).

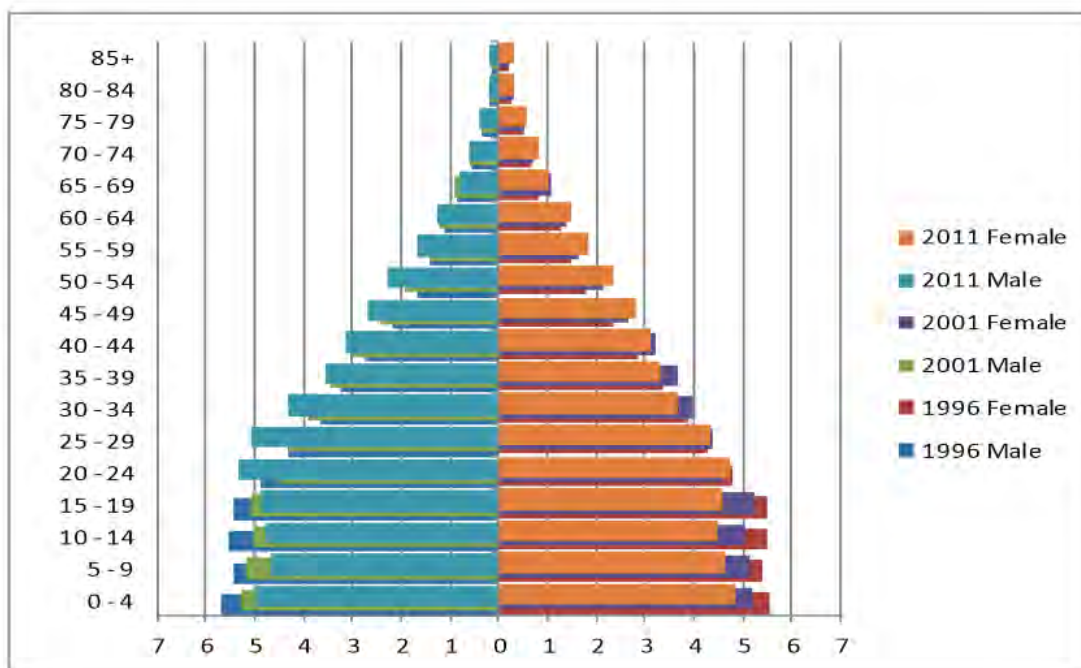


Figure 3.11: Age Distribution of the ZF Mgqawu DM (Statistics South Africa, 2011).

### 3.3.12.2 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 3.12 below.

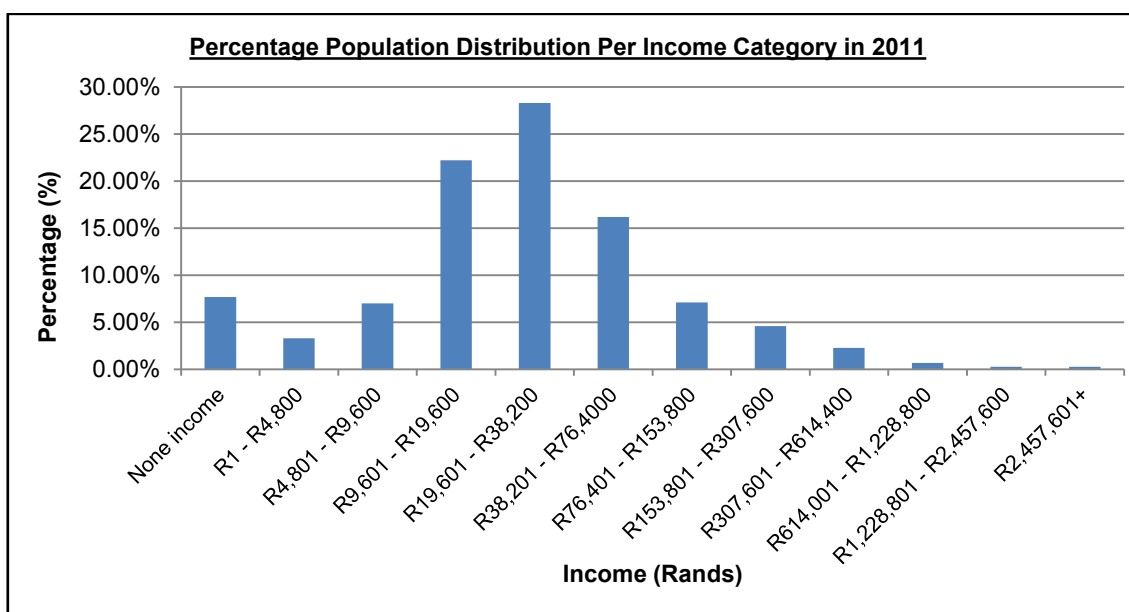


Figure 3.12: Income Distribution of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

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, only 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 3.13 below.

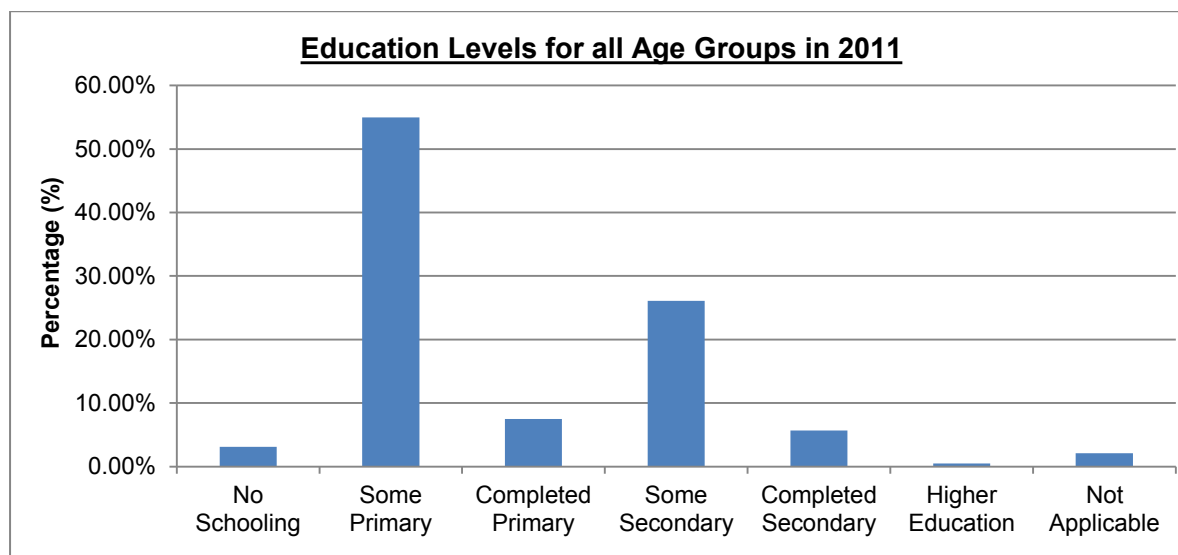


Figure 3.13: Education Levels of the !Kheis Local Municipality in 2011 (Statistics South Africa, 2015).

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 ZF Mgcawu DM IDP 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.

# EIA REPORT



## CHAPTER 4:

# Approach to EIA Process and Public Participation

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

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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 (CSIR, 2015).

The purpose of the EIA Phase is to:

- Address issues that have been identified through the Scoping Process;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and
- Recommend actions 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);
- 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, Scatec Solar, what the consequences of their choices will be in biophysical, social and economic terms. As such it identifies potential impacts (negative and positive) that the project may have on the environment. The EIA makes recommendations to mitigate negative impacts and enhance positive impacts associated with the proposed project.

### 4.1 Overview of Approach to Preparing the EIA Report and EMPr

The objectives of the EIA Phase are noted in Chapter 1 of this EIA Report. The results of the specialist studies and other relevant project information for the Kenhardt PV 1 project have been included in this finalised EIA Report (Chapters 7 to 15). Chapter 16 of this EIA Report includes a summary of the findings, the overall conclusions and the recommendations. The EIA Report was released for a 30-day I&AP and authority review period extending from 3 March 2016 to 5 April 2016, as outlined in Section 4.4. All registered I&APs on the project database were notified in writing of the release of the EIA Report for review.

In the Scoping Report it was proposed to potentially hold a public meeting during the 30-day comment period for the EIA Report, if warranted, and if there was substantial public interest. However, due to the limited public input and/or interest in the proposed project, this was not deemed necessary. Comments raised during the review of the 30-day review of the EIA Report, through written correspondence (emails, letters, comments, forms), have been captured in an updated Comments and Responses Trail (Chapter 6) for inclusion in this finalised EIA Report that is being submitted to the DEA for decision-making in terms of Regulation 23 (1) (a) of the 2014 EIA Regulations. Comments raised have been responded to by the EIA team and/or the Applicant. These

responses indicate how the issue has been dealt with in the EIA Process. Where the comment received falls beyond the scope of this EIA, clear reasoning has been provided.

As previously noted, this finalised EIA Report includes an EMPr (Part B of this EIA Report), which has been prepared in compliance with the relevant regulations (i.e. Appendix 4 of the 2014 EIA Regulations). This EMPr is based broadly on the environmental management philosophy presented in the ISO 14001 standard, which embodies an approach of continual improvement. Actions in the EMPr are drawn primarily from the management actions in the specialist studies for the construction and operational phases of the project. If the project components are decommissioned or re-developed, this will need to be done in accordance with the relevant environmental standards and clean-up/remediation requirements applicable at the time.

## 4.2 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 finalised 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 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"*.

All the listed activities potentially forming part of this proposed development and therefore requiring EA were included in the original Application Form for EA that was prepared and submitted to the DEA on 30 September 2015 together with the Scoping Report. Refer to Appendix E of this EIA Report for the proof of submission of the original Application Forms to the DEA (i.e. courier waybills). As noted in Chapter 1 of this EIA Report, the DEA acknowledged receipt of the Scoping Report and Application for EA on 26 October 2015 via email (as shown in Appendix I.2 of this EIA Report). DEA EIA Reference Number: 14/12/16/3/3/2/837 was assigned to the Kenhardt PV 1 project. A copy of the original Application Form for the Kenhardt PV 1 project and the letter of acknowledgement from the DEA have been respectively included in Appendix H of the Scoping Report and Appendix I.2 of this EIA Report.

As noted in Chapter 1 of this EIA Report, the DEA accepted the finalised Scoping Report and Plan of Study for EIA on 8 December 2015 (as shown in Appendix I.4 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 original Application for EA and the finalised Scoping Report (as shown in Appendix H of the Scoping 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: Listed Activities in GN R982 and GN R983 that potentially form part of the proposed Kenhardt PV 1 project**

DEA Requirement (as noted in the Acceptance of the Scoping Report and Plan of Study for EIA)	CSIR Response
<p>Clarity must be provided regarding GN R983 Listed Activity 9 (i) or (ii) and GN R983 Listed Activity 10 (i) or (ii). An amended Application for EA must be submitted.</p>	<p>The proposed project will entail the construction of stormwater channels or pipelines only. However, water pipelines will no longer be required for the proposed project.</p> <p>It was noted in the Scoping Report that water pipelines may need to be constructed in order to transfer groundwater from existing boreholes to the proposed solar facility. During the Scoping Phase, the Project Applicant intended to make use of existing boreholes to source groundwater (if available and if suitable) for the solar panel cleaning process. It was further noted in the Scoping Report and Application for EA that the Geohydrological Assessment (undertaken during the EIA Phase) will confirm whether the groundwater is sufficient and suitable for use. However, the Geohydrological Assessment (Chapter 11 of this EIA Report) recommends that the groundwater is not suitable for use during the construction and operational phases. Therefore, water pipelines will not need to be constructed in order to transfer groundwater from existing boreholes to the proposed solar facility. As a result, water will therefore be sourced from the municipality. Approximately 5 to 10 tanks will be provided on site for the storage of municipal water during the construction and operational phases. The tanks will have a capacity of 10 000 liters each. As a result, Activity 9 (i) and (ii) of GN R983 is no longer applicable in terms of the construction of water pipelines.</p> <p>Furthermore, in terms of stormwater infrastructure, at this stage of the design it is understood that the stormwater infrastructure will cover an approximate length of 1000 m. However, the stormwater infrastructure will not have an internal diameter of more than 0.36 m, and it will not have a peak throughput of more than 120 l/s. Therefore Activity 9 (i) and (ii) of GN R983 is no longer applicable in terms of the construction of stormwater infrastructure.</p> <p>Therefore, Activity 9 (i) and (ii) of GN R983 has been removed from the original Application for EA. Accordingly, an amended Application for EA has been submitted to the DEA together with this <u>finalised EIA Report</u> for decision-making. The amended Application for EA has been submitted to the DEA as a separate document and has been included in Appendix H of this finalised EIA Report.</p> <p>The same applies to Activity 10 (i) and (ii) of GN R983 in terms of infrastructure for the transportation of sewage and effluent. At this stage of the design it is understood that the</p>

DEA Requirement (as noted in the Acceptance of the Scoping Report and Plan of Study for EIA)	CSIR Response
	<p>sewage infrastructure will cover an approximate length less than 1000 m, and it will not have an internal diameter of more than 0.36 m, or a peak throughput of more than 120 l/s. Therefore Activity 10 (i) and (ii) of GN R983 is no longer applicable in terms of the construction of stormwater infrastructure.</p> <p>Notwithstanding the above, it is important to note that the impact of the construction and operation of the proposed project (inclusive of all infrastructural components) has been assessed in the specialist studies, as included in Chapters 7 to 14 of this EIA Report. For example, the Ecological Impact Assessment (Chapter 7 of this finalised EIA Report) assesses the potential impact of proposed alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure within the site and immediately adjacent areas. This impact is rated with a low significance without mitigation measures and very low significance with the implementation of mitigation measures. The Ecological Impact Assessment also assesses the potential impact of the alteration of ecological processes due to the exclusion of certain fauna, which is inherent to the functional state of the land within the proposed PV facility. This operational phase direct impact is rated with a low significance, with the implementation of mitigation measures. The Visual, Heritage, Palaeontological, Geohydrological, Soils and Social Impact Assessment specialist studies also provide additional impact assessments relating to the construction and operation of the proposed facility.</p>
<p>The EIA Report must include the following: GN R983 Listed Activity 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 alternative 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 must be adequately assessed in the EIA Report.</p>	<p>The proposed project may entail the excavation, removal and moving of possibly more than 5 m<sup>3</sup> of soil, sand, pebbles or rock from the nearby minor drainage lines/watercourses. The proposed project may also entail the infilling of more than 5 m<sup>3</sup> of material into the nearby minor drainage lines/watercourses. This infilling and excavation of the material will occur as a result of the construction of the internal gravel road, as well as the upgrading and widening of the unnamed farm road to gain access to the site and to facilitate easy mobility of trucks and heavy vehicles. It is important to note that the existing unnamed farm road traverses the Rugseers River, which is considered a major drainage line, within the Kenhardt PV 3 study area. The widening of the unnamed farm road will therefore possibly result in infilling or excavation of more than 5 m<sup>3</sup> of material from the Rugseers River.</p> <p>The Ecological Impact Assessment undertaken as part of the EIA Process has identified major drainage lines on site (such as the Wolfkopseloop River and major drainage features that serve the</p>

DEA Requirement (as noted in the Acceptance of the Scoping Report and Plan of Study for EIA)	CSIR Response
	<p>Wolfkopseloop (i.e. tributaries)). The Ecological Impact Assessment has recommended a 32 m buffer around the major drainage lines. However, the Ecological Impact Assessment also identified various minor drainage lines that occur within the Kenhardt PV 1 area (which do not need to be avoided based on the findings of the Ecological Impact Assessment). Therefore, activities associated with the construction of the proposed project (as noted above, i.e. construction of the gravel road and the upgrading and widening of the unnamed farm road to gain access to the site etc.) may result in infilling and excavation of material within the minor and major drainage lines.</p> <p>In terms of providing an indication of the preferred and alternative locations from which the material used for infilling will be sourced and where excavated material will be stored and/or disposed of, refer to the site layout plan shown in Appendix J of this finalised EIA Report, which explains that cut and fill areas and spoil heap locations and details will be confirmed at design stage.</p> <p>In terms of the locations where the excavated material will be stored and/or disposed of, this will be required for the upgrading and widening of the unnamed farm access road, which is indicatively shown the preliminary site layout plan in Chapter 16 and Appendix J of this EIA Report.</p> <p>Notwithstanding the above, it is expected that the upgrading and widening of the unnamed farm road will result in crossings of major and minor drainages lines on site. The details of these crossings will be determined during the detailed design phase.</p>
<p>It is noted that no activity under GN R985 is being applied for. However, should they at a later stage be found to be applicable, an amended application form as well as written comments must be obtained and submitted to this Department confirming their applicability to the proposed development. In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.</p>	<p>The proposed project only triggers one listed activity within GN R985 (refer to the explanation below), however this is based on a distance of 100 m from a major drainage line, and none of the other geographical areas. Based on the EIA and the 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 Focus Areas or areas of conservation planning. The closest protected area is approximately 113 km away from the proposed project site. An Ecological Support Area (i.e. a buffer around the Hartbees River) is located approximately 14 km west of proposed project as part of the Namakwa District Biodiversity Sector Plan. Furthermore, 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. Therefore, most of the</p>

DEA Requirement (as noted in the Acceptance of the Scoping Report and Plan of Study for EIA)	CSIR Response
	<p>listed activities relating to specific geographic areas contained in GN R985 of the 2014 NEMA EIA Regulations do not apply to the proposed project at this stage.</p> <p>This is also confirmed in the Ecological Impact Assessment (Chapter 7 of this EIA Report), which states 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. As noted above, certain listed activities are no longer applicable to the proposed project and therefore need to be removed from the original Application for EA. Activity 9 (i) or (ii); and Activity 10 (i) or (ii) of GN R983 as included in the original Application for EA, are no longer applicable to the proposed project. In addition, Activity 24 (ii) of GN R983 (which was included in the original Application for EA) is also no longer applicable to the proposed project (which is discussed further below). On the other hand, Activity 56 (i) of GN R983 and Activity 18 (a) (ii) (ii) of GN R985, have become applicable to the proposed project (i.e. triggered by the proposed project, as a result of the design progression).

Activity 56 (i) of GN R983 and Activity 18 (a) (ii) (ii) of GN R985 are triggered by the proposed project as a result of the access road to site and the need for it to be upgraded and widened. As noted in Chapter 2 of this finalised EIA Report, in terms of access, the proposed project site can be accessed via an existing gravel road (an unnamed farm road) and the existing Transnet Service Road (private). Both access routes are considered and included in the proposed project. The Transnet Service Road and unnamed farm road are both in some sections wider than 8 m; however in certain sections, the unnamed farm road is believed to be about 2-3 m wide. Discussions have been held with Transnet and the Project Applicant regarding the potential use of the Transnet Road and associated specific requirements. However, should the Transnet Service Road not be used for access, then the unnamed farm gravel road will be used. This farm road, however, will need to be upgraded and widened by more than 6 m (where required) to allow and facilitate the access of trucks and heavy vehicles. Both these impacts have been assessed in the EIA Phase, as explained below.

Therefore, in order to ensure that the listed activities presented in the EIA Report and the Application for EA are the same, an amended Application for EA has been submitted to the DEA together with the submission of this finalised EIA Report for decision-making. The listed activities that are triggered by the proposed project are indicated in Table 4.2. Table 4.2 also shows the sections in this finalised EIA Report where the triggered listed activity is assessed.



**Table 4.2: Listed Activities in GN R983, R984 and GN R985 that potentially form part of the proposed Kenhardt PV 1 project**

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
<b>GN R983</b>			
<b>Activity 12 (x) and (xii)</b>	<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) within a watercourse;</p> <p>b) in front of a development setback; or</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 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>The proposed solar PV facility will be constructed on the remaining extent of Onder Rugzeer Farm 168, 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 75 MW Solar PV facility will entail the construction of building infrastructure and structures (such as the solar field, offices, workshop/warehouse, ablution facilities, operational and maintenance control centre, on-site substation, laydown area and security enclosures, as well as the widening of the access road etc.). As shown in Chapter 2 of this finalised EIA Report, the offices, workshop/warehouse, operational and maintenance control centre, on-site substation building and inverter stations will exceed an area of 100 m<sup>2</sup>. It is estimated that the total area required for the proposed building structures is 1500 m<sup>2</sup>. The on-site substation will also cover an approximate area of 20 000 m<sup>2</sup>. This constitutes buildings and infrastructure with a physical footprint of more than 100 m<sup>2</sup>.</p> <p>It was noted in the Scoping Report that based on the preliminary sensitivity screening undertaken for the site, the buildings and infrastructure are expected occur within 32 m of the watercourses on site (i.e. the minor drainage lines).</p>	<p>As noted in the Ecological Impact Assessment (Chapter 7 of this EIA Report), the Wolfkopseloop is a drainage feature that lies to the north of the site and inundated on an intermittent basis (periods greater than a year), and forms the most significant surface feature in the vicinity. The Kenhardt PV 1 area forms part of the immediate catchment surrounding the Wolfkopseloop River. Three major drainage features also serve the Wolfkopseloop. A buffer of 32 m has been applied to Wolfkopseloop drainage feature and the three tributaries that serve it, where it intersects with the project area.</p> <p>Wolfkopseloop drains into the Hartebees River, which in turn serves the Sout River and Orange River systems. The Rugseers River also flows through the remaining extent of Onder Rugzeer Farm 168, however not within the area of Kenhardt PV 1.</p> <p>Other minor drainage features are noted within the subject site. The Ecological Impact Assessment (Chapter 7 of this EIA Report) also explains that minor drainage lines are of less significance, but should be given consideration, where they may intersect with the development footprint of the proposed solar PV facility. However, these morphological features do not have to be avoided.</p> <p>The impact of constructing buildings, structures and infrastructure associated with</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>This has been confirmed in the Ecological Impact Assessment specialist study (included in Chapter 7 of this EIA Report), which identified major drainage lines on site (such as the Wolfkopseloop River and three major drainage features that serve the Wolfkopseloop (i.e. tributaries)). The Ecological Impact Assessment has recommended a 32 m buffer around the major drainage lines within the Kenhardt PV 1 area. However, the assessment also identified various minor drainage lines that occur within the Kenhardt PV 1 area which do not need to be avoided.</p> <p>Therefore, infrastructure associated with the proposed project may occur within the minor drainage lines or within 32 m of the edge of the minor (and major) drainage lines.</p>	the Kenhardt PV 1 area are assessed in the Ecological Impact Assessment (Chapter 7 of this EIA Report).
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;                      (ii) the seashore; or                      (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater,</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <p>a) will occur behind a development setback;                      b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or</p>	<p>The proposed project may entail the excavation, removal and moving of more than 5 m<sup>3</sup> of soil, sand, pebbles or rock from the nearby watercourses. The proposed project may also entail the infilling of more than 5 m<sup>3</sup> of material into the nearby watercourses.</p> <p>The Ecological Impact Assessment specialist study (included in Chapter 7 of this EIA Report), identified major drainage lines on site (such as the Wolfkopseloop River and three major drainage features that serve the Wolfkopseloop (i.e. tributaries)). The Ecological Impact Assessment has recommended a 32 m buffer around the major drainage lines within the Kenhardt PV 1 area. However, the assessment also identified various minor drainage lines that occur within the Kenhardt PV 1 area which do not need to be avoided. Therefore, construction of the internal gravel roads and/or the</p>	The impact of the proposed Kenhardt PV 1 solar facility is assessed in the Ecological Impact Assessment (Chapter 7 of this 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
	c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.	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. The Ecological Impact Assessment also notes that despite the minor drainage lines not requiring avoidance, it would be best for the design of the proposed solar PV facility to note the presence of these minor features and avoid establishing structures such as transformers, buildings and other permanent and significant structures within them. If necessary, it would be best to incorporate the minor drainage lines into the solar arrays.	
<b>Activity 28 (ii)</b>	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;  excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The proposed project will take place on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt in the Northern Cape. It is understood that the land is currently used for agricultural purposes (mainly grazing). The proposed 75 MW solar PV facility (i.e. Kenhardt PV 1), which is considered to be a commercial/industrial development, will have an estimated footprint of approximately 250 ha (i.e. more than 1 ha).	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 12 of the EIA Report) also addresses the current use of the land and its potential for agricultural use.
<b>Activity 56 (i)</b>	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre:  (i) where no reserve exists, where the existing road is wider than 8 metres;  excluding where widening or lengthening occur inside urban areas.	In terms of access, the proposed project site can be accessed via an existing gravel road (an unnamed farm road) and the existing Transnet Service Road (private). Both access routes will be considered and included in the proposed project. The R27 extends from Keimoes (in the north) 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 can be accessed from the R27. The existing gravel road (an unnamed farm road) can be accessed from the R383 Regional	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.

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>Road also via the R27 National Road. The Transnet Service Road and unnamed farm road are both wider than 8 m in some sections; however in certain sections, the unnamed farm road is believed to be about 2-3 m wide.</p> <p>Discussions are being held with Transnet and the Project Applicant regarding the potential use of the Transnet Road and associated specific requirements. However, should the Transnet Service Road not be used for access, then the unnamed farm gravel road will be used. This farm road, however, will need to be upgraded and widened by more than 6 m (where required).</p> <p>The proposed project will take place 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>	
<b>GN R984</b>			
<b>Activity 1</b>	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.	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 Onder Rugzeer Farm 168, 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.	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.
<b>Activity 15</b>	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for:	The proposed 75 MW solar PV facility (i.e. Kenhardt PV 1) will have an estimated footprint of approximately 250 ha. The Kenhardt PV 1, PV 2 and PV 3 proposed projects will have a	The impact of the footprint of the proposed PV facility on terrestrial ecology is assessed in the Ecological Impact Assessment (Chapter 7 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
	(i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	collective footprint of approximately 750 ha. As a result, more than 20 ha of indigenous vegetation could possibly be removed for the construction of the proposed Solar PV facility.	
<b>GN R985</b>			
<b>Activity 18 (a) (ii) and (ii)</b>	<p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. In Free State, Limpopo, Mpumalanga and Northern Cape provinces:</p> <p>(ii) outside urban areas and</p> <p>(ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined.</p>	<p>In terms of access, the proposed project site can be accessed via an existing gravel road (an unnamed farm road) and the existing Transnet Service Road (private). Both access routes will be considered and included in the proposed project. The R27 extends from Keimoes (in the north) 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 can be accessed from the R27. The existing gravel road (an unnamed farm road) can be accessed from the R383 Regional Road also via the R27 National Road. The Transnet Service Road and unnamed farm road are both wider than 8 m in some sections; however in certain sections, the unnamed farm road is believed to be about 2-3 m wide.</p> <p>Discussions are being held with Transnet and the Project Applicant regarding the potential use of the Transnet Road and associated specific requirements. However, should the Transnet Service Road not be used for access, then the unnamed farm gravel road will be used. This farm road, however, will need to be upgraded and widened by more than 6 m (where required).</p> <p>The Ecological Impact Assessment undertaken as part of the EIA Process has identified major drainage lines on site (such as the</p>	The impact of the footprint of the proposed PV facility on terrestrial ecology is assessed in the Ecological Impact Assessment (Chapter 7 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
		<p>Wolfkopseloop River and major drainage features that serve the Wolfkopseloop (i.e. tributaries)). The Ecological Impact Assessment has recommended a 32 m buffer around the major drainage lines. However, the Ecological Impact Assessment also identified various minor drainage lines (which do not need to be avoided based on the findings of the Ecological Impact Assessment). Therefore, the proposed gravel road widening may occur within 100 m of the edge of the minor and major drainage lines.</p> <p>The proposed project will take place 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>	

#### **Notes regarding the identification of potential listed activities:**

- It is proposed that less than 30 m<sup>3</sup> 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 have been provided in the EMPr (Part B of the EIA Report).
- As noted above, Activity 24 (ii) of GN R983, which was included in the original Application for EA, is no longer applicable to the proposed project. This is due to the reasoning that the access roads and internal gravel roads that will be constructed on site will not exceed a width of 6 m. The internal gravel road is not expected to exceed 6 m in width (it is expected to be approximately 4 m wide). An approximately 2.5 m wide perimeter road will also be constructed within the fenced area of the plant. At this stage of the design it is estimated that the internal gravel road and the perimeter road will extend 2000 m in length. Therefore, Activity 24 (ii) of GN R983 is not included in the Amended Application for EA.
- The relevant listed activities applicable to the construction of the proposed transmission lines and associated electrical infrastructure at the Eskom Nieuwehoop Substation are included in the separate BA Reports and the Applications for EA for the BA Processes. As mentioned previously, the Applications for EA for the BA Processes were lodged with the DEA in March 2016 (together with the submission of the EIA and BA Reports for comment), in order to comply with the timeframes stipulated in Regulation 19 (1) of GN R982. DEA provided an acknowledgement of receipt of the Applications for EA for the BA projects on 1 April 2016 and assigned the following DEA Reference Numbers to the projects: Kenhardt PV 1 - Transmission Line (14/12/16/3/3/1/1547); Kenhardt PV 2 - Transmission Line (14/12/16/3/3/1/1546); and Kenhardt PV 3 - Transmission Line (14/12/16/3/3/1/1545).

### **4.3 Legislation and Guidelines Pertinent to this EIA**

The scope and content of this EIA Report has 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.

#### **4.3.1 National Legislation**

##### **4.3.1.1 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.

#### **4.3.1.2 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.

#### **4.3.1.3 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 sensitivity screening undertaken for the proposed site, none of the threatened ecosystems occur within the study area. This has been confirmed as part of the Ecological Impact Assessment (Chapter 7 of this EIA Report).



#### 4.3.1.4 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 5000 m<sup>2</sup> 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 m<sup>2</sup> 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 townscape” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value. Section 38 (2a) of the NHRA states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted.

A Heritage Impact Assessment (including Archaeology and Cultural Landscape) and a desktop Palaeontological Impact Assessment has been undertaken as part of the EIA Phase of the proposed project. These relevant specialist studies are respectively included in Chapters 9 and 10 of this finalised EIA Report.

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. To this end and to facilitate comment from the relevant heritage authorities, the proposed project was loaded onto the South African Heritage Resources Information System (SAHRIS) on 30 and 31 July 2015 (during the Project Initiation Phase). An application was created for each project and all necessary project information (including the BID, Letter 1, and Comment and Registration Form) was uploaded to the SAHRIS. The following Case Reference Numbers were allocated to the proposed projects:

- Kenhardt PV 1: 8204;
- Kenhardt PV 2: 8205;
- Kenhardt PV 3: 8206;
- Kenhardt PV 1 - Transmission Line: 8207;
- Kenhardt PV 2 - Transmission Line: 8208; and
- Kenhardt PV 3 - Transmission Line: 8209.

Comments were provided by SAHRA (dated 22 September 2015) and loaded onto SAHRIS in response to the review of the BID (as part of the Project Initiation Phase). These comments have been captured in Chapter 6 (Comments and Responses Trail) and Appendix G of this EIA Report. In line with best practice, the Scoping Report (which was made available to I&APs for comment) was also uploaded onto SAHRIS on 25 September 2015, during the 30-day review period. As noted previously, the Heritage Impact Assessment (including Archaeology and Cultural Landscape) and desktop Palaeontological Impact Assessment, along with the EIA Reports, were uploaded to SAHRIS for comment by the heritage authorities during the 30-day review of the EIA Report. SAHRA provided final comment via SAHRIS on 5 April 2016. These comments have been included in Appendix G and Chapter 6 of this EIA Report (Comments and Responses Trail), where they have been addressed with adequate responses. These comments from SAHRA are also included in Appendix G of this finalised EIA Report, for submission to the DEA for decision-making. The status of the case files on SAHRIS is “closed and approved”.

The final comment issued by the heritage authority, as well as the recommendations therein, will be considered by the DEA during the decision-making phase and will be included in the conditions of the EA where required (should such an authorisation be granted). This essentially gives ‘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.

#### **4.3.1.5 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*. The Ecological Impact Assessment (Chapter 7 of this EIA Report) established that none of the protected species in terms of the National Forest Act (Act 84 of 1998) were found on site during the survey. The Ecological Impact Assessment also notes that it is unlikely that an application for the “clearing of a natural forest”, as defined within the National Forest Act (Act 84 of 1998), will be required for the Kenhardt PV 1 site.

#### **4.3.1.6 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 (Chapter 7 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 finalised EIA Report. Several follow up emails were sent by the CSIR to the DAFF to seek comments on the EIA Report during the 30-day comment. These follow up emails are included in Appendix E of this finalised EIA Report. However, to date, no comments on the EIA Report were provided by the DAFF. Only a single email (as included in Appendix G of this finalised EIA Report) was sent by DAFF subsequent to the closure of the comment period (i.e. on 6 April 2016) to seek a locality and layout map of the proposed project. The CSIR accordingly provided the requested information to the DAFF via email on 6 April 2016 (as shown in Appendix E of this finalised EIA Report).

#### **4.3.1.7 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 (Chapter 7 of this EIA Report) includes additional information regarding the need for a WUL. The Ecological Impact Assessment states that authorisation for changes in land use; up to 500 m from a defined water resource/wetland system will require an application for a WUL from the DWS. The Ecological Impact Assessment explains 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.

However, it is important to note that considerable efforts will be made to place the proposed solar field and project infrastructure outside of wetland areas and any sensitive surface hydrological features identified by the specialist. As noted above, a 32 m buffer has been recommended around the major drainage lines (i.e. the Wolfkopseloop) within the Kenhardt PV 1 area. As noted previously, the preferred site for the proposed Kenhardt PV 1 project includes approximately 450 ha of land, however the proposed solar facility and associated infrastructure requires a development area of approximately 250 ha only. The larger area has been proposed to allow for the avoidance of major environmental constraints through the final design of the facility (i.e. the location and layout of the 250 ha facility will, as far as possible, be sited outside of the sensitive areas identified by the specialists). Additional information regarding the siting of the proposed 250 ha facility and the Development Envelope is provided in Chapter 16 of this EIA Report.

The DWS was consulted with during the EIA Process to confirm the need for a WUL, as well as to seek comment on the proposed project. It is important to note that the Regional DWS have provided preliminary comment on the Scoping Report during the 30-day review period. These comments are included and addressed in Chapter 6 (Comments and Responses Trail), and included in Appendix G of this EIA Report. During the EIA Phase, follow up emails were sent to the DWS in March and April 2016 to verify if the DWS have any comments on the EIA Reports. Copies of these follow up emails are included in Appendix E of this finalised EIA Report. The DWS provided combined comments on the EIA and BA Reports on 5 April 2016, which are included in Appendix G of this finalised EIA Report. However, these comments are the same as those comments issued by the DWS during the Scoping Phase. Responses to these comments are included in Chapter 6 of this finalised Scoping Report.

#### 4.3.1.8 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 Kenhardt PV 1 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 20 km from the proposed project. The SKA office will be contacted during the EIA Phase to confirm whether the proposed project in Kenhardt poses a risk to the SKA project. The SKA have 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. Comments received from the SKA Project Office during the Project Initiation Phase are included in Appendix G and Chapter 6 of this EIA Report. In addition, the SKA Project Office was provided with a hard copy and CD copy of the Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 Scoping Reports via courier on 30 September 2015 (Refer to Appendix E for proof of submission (i.e. courier waybills)).

During the EIA Phase, the SKA were also provided with a CD copy of the Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 EIA Reports, and the Kenhardt PV 1 - Transmission Line, Kenhardt PV 2 - Transmission Line and Kenhardt PV 3 - Transmission Line BA Reports.

According to the SKA, based on distance to the nearest SKA station, the location of the station, and the information currently available on the design of the PV installation, the proposed facility poses a medium to high risk of detrimental impact on the SKA. In line with this, Electro Magnetic Interference (EMI) and Radio Frequency Interference (RFI) studies have been undertaken and commissioned by the Project Applicant 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 K of this EIA Report, with a summary provided in Chapter 15.

The CSIR consulted with the SKA Project Office during the 30-day review of the Scoping Reports and addendum in order to confirm if the SKA could provide any details regarding the requirements and scope for the requested EMI and RFI studies, as well as to confirm if the SKA has any further comments on the Scoping Reports and addendums. Refer to Appendix E of this EIA Report for the email correspondence sent by the CSIR to the SKA Project Office. The SKA Project Office confirmed that the comments received on 2 September 2015, in response to the review of the BID, are still valid and that no further comments were required during the Scoping Phase. The SKA Project Office further noted that comments will be provided on the EMI and RFI studies, as part of the EIA Report, during the EIA Phase. Refer to Appendix G and Chapter 6 of this EIA Report, which includes the comments raised by the SKA Project Office during the Scoping Report review phase.

During the EIA Phase, the SKA Project Office provided comments on the EIA Reports, including the technical report compiled by MESA Solutions (PTY) Ltd. These comments are included in Chapter 6 and Appendix G of this finalised EIA Report, with responses provided in Chapter 6 as well. The CSIR reviewed these comments and contacted the SKA Project Office regarding queries on the

interpretation of the comments. These follow up emails from the CSIR are included in Appendix E of this finalised EIA Report. The SKA Project Office responded via email on 7 April 2016 with additional information regarding the mitigation measures proposed in the technical report, as well as the recommendations from the SKA Project Office. Copies of these comments are included in Appendix G and Chapter 7 of this finalised EIA Report.

#### **4.3.1.9 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. Additional information regarding this is provided in the Soils and Agricultural Potential Assessment specialist study (Chapter 12 of this EIA Report).

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

#### **4.3.1.11 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
- National Road Traffic Act (Act 93 of 1996).

### **4.3.2 Provincial Legislation**

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#### **4.3.2.1 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 follows:

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

With regards to protected flora, the Northern Cape Nature Conservation Act includes a list of protected flora. The plant species potentially present within the proposed project area has been identified as part of the Ecological Impact Assessment specialist study (Chapter 7 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 (Part B of the EIA Report), 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 or destruction. 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. This has also been confirmed in the Ecological Impact Assessment (Chapter 7 of this EIA Report).

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 were 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 Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 Scoping Reports via courier on 30 September 2015 (Refer to Appendix E for proof of submission (i.e. courier waybills)).

The Department were also provided with a CD copy of the Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 EIA Reports, and the Kenhardt PV 1 - Transmission Line, Kenhardt PV 2 - Transmission Line and Kenhardt PV 3 - Transmission Line BA Reports in March 2016, during the 30-day review period. Several follow up emails (as included in Appendix E of this finalised EIA Report) were sent to the Provincial Department of Environment and Nature Conservation during the 30-day review period to confirm if the Department has any comments on the EIA and BA Reports. However, no formal responses have been received from the Department to date. The Department was also contacted via telephone in April 2016 during which it was confirmed that the Department does not have any comments on the EIA and BA Reports, as the comments raised during the Scoping Phase were addressed. In line with Regulation 3 (4) of the 2014 EIA Regulations, it is therefore regarded that the Provincial Department of Environment and Nature Conservation has no comments on the EIA and BA Reports.

#### ***4.3.2.2 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 Kenhardt PV 1 project does not fall within this corridor.

### 4.3.3 Local Planning Legislation

#### 4.3.3.1 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.

#### 4.3.3.2 !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).

#### 4.3.3.3 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 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.

#### 4.3.3.4 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 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.

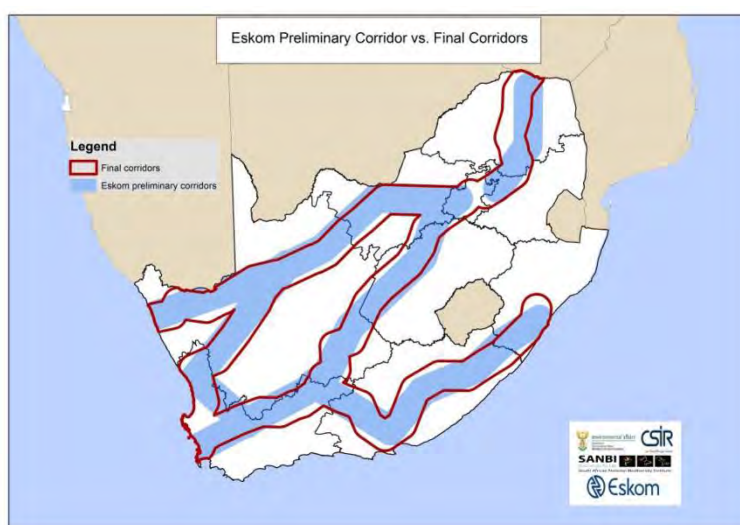


Figure 4.1: Eskom Preliminary and Final Corridors assessed as part of the EGI SEA (CSIR, 2015b)



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.

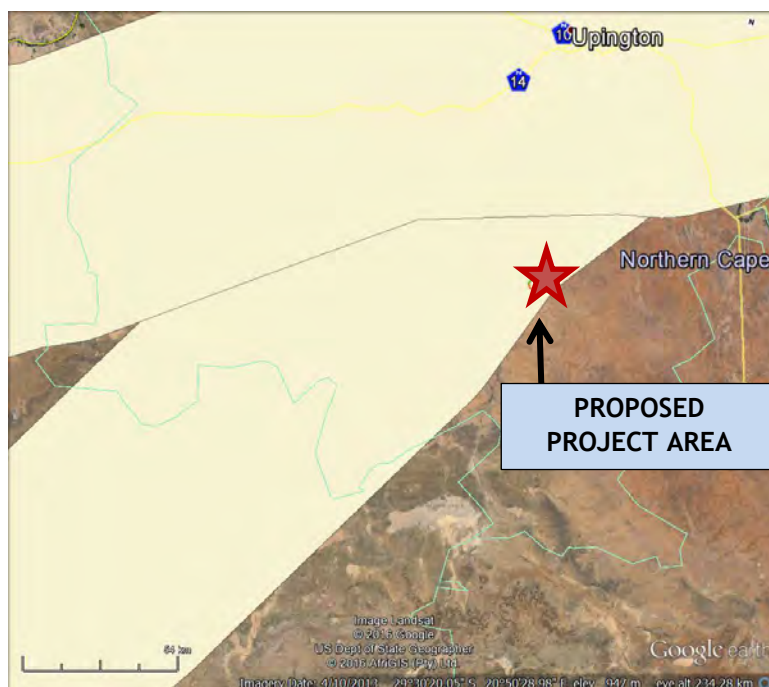


Figure 4.2: Eskom Final Corridor assessed as part of the EGI SEA and the Location of the proposed Kenhardt PV 1, PV 2 and PV 3 EIA projects and the Kenhardt PV 1 - Transmission Line, Kenhardt PV 2 - Transmission Line and Kenhardt PV 3 - Transmission Line BA Projects (CSIR, 2015b). Image Source: Google Earth, 2016.

#### 4.3.3.5 Guidelines, Frameworks and Protocols

- Public Participation Guideline, October 2012 (Government Gazette 35769);
- DEADP and DEA Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Guideline on Transitional Arrangements (DEADP, March 2013);
  - Guideline on Alternatives (DEADP, March 2013);
  - Guideline on Public Participation (DEADP, March 2013); and
  - Guideline on Need and Desirability (DEADP, March 2013);
- Information Document on Generic TOR 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).

#### 4.3.4 International Finance Corporation Performance Standards

In order to promote responsible environmental stewardship and socially responsible development, the proposed Kenhardt PV 1 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, projects such as the proposed Kenhardt PV 1 project are categorised as Category B projects. The EA Process for Category B projects examines the project's potential negative and positive environmental impacts and compares them with those of feasible alternatives (including the 'without project' scenario). As required for Category B projects a Scoping and EIA Process is being undertaken for the Kenhardt PV 1 project

As noted above, other Acts, standards and/or guidelines which may also be applicable have been reviewed in more detail as part of the specialist studies (Chapters 7 to 14 of this EIA Report).

#### 4.4 Principles for Public Participation

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The PPP for this EIA Process has been driven by a stakeholder engagement process that included inputs from authorities, 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 Competent Authority (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.
- 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.

## 4.5 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 (as shown in Appendix I.4 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 finalised EIA Report, an integrated PPP has been undertaken for the three Scoping and EIA projects (i.e. Kenhardt PV 1, Kenhardt PV 2, and Kenhardt PV 3), as well as the three BA projects (i.e. Kenhardt PV 1 - Transmission Line, Kenhardt PV 2 - Transmission Line, and Kenhardt PV 3 - Transmission Line). Separate Scoping, BA 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. have served to notify the public and organs of state of the joint availability of all reports for the abovementioned projects and provided I&APs with an opportunity to comment on the reports. As previously noted, the BA Reports were released with the EIA Reports in order to comply with the timeframes stipulated in the 2014 EIA Regulations. This process is outlined in Figure 4.3 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 I.1 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 projects 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 was advertised in one local newspaper (i.e. The Gemsbok) during the Project Initiation Phase on 29 July 2015. Furthermore, to inform the public and stakeholders of the release of the EIA Report for the 30-day review period in March 2016, an advertisement was also placed in The Gemsbok on 2 March 2016. A copy of the advertisements placed is contained in Appendix D of this EIA Report.

Furthermore, Regulation 41 (2) (a) of the 2014 EIA Regulations require 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, an 841 mm x 594 mm notice board was placed at the locations shown in Table 4.3 on 3 August 2015 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 BA, Scoping and EIA Processes (Kenhardt PV 1, Kenhardt PV 2, Kenhardt PV 3, Kenhardt PV 1 - Transmission Line, Kenhardt PV 2 - Transmission Line and Kenhardt PV 3 - Transmission Line)**

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	Afrikaans
Entrance to the alternative access road (unnamed farm road), which serves as one of the access routes to the (preferred and alternative) project sites.	29° 16' 21.13" S and 21° 19' 15.17" E	English
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

The correspondence sent to I&APs during the Scoping Phase (including the submission of the finalised Scoping Reports to the DEA) and the EIA Phase 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) and the EIA Phase (i.e. during the 30-day review of the EIA Reports). Appendices E and G have been respectively updated with correspondence sent to I&APs for the release of the EIA Reports, and comments received from I&APs during the review of the EIA Report.

#### **TASK 1: I&AP REVIEW OF THE EIA REPORT AND EMPR**

The first stage in the process entailed the release of the EIA Reports for a 30-day I&AP and stakeholder review period. As noted above, the BA Reports for each transmission line project was released to I&APs for review at the same time as the EIA Reports (i.e. on 3 March 2016). Relevant organs of state and I&APs were informed of the review process in the following manner:

- Placement of one advertisement in The Gemsbok local newspaper to notify potential I&APs of the availability of the EIA Reports. The advertisement was placed on 2 March 2016. The Gemsbok is a weekly newspaper which is distributed every Wednesday and made available from Wednesday to Friday; however it is dated for a Friday (in this case, 4 March 2016). Refer to Appendix D of this finalised EIA Report for a copy of this newspaper advertisement placed;
- A letter (dated 4 March 2016) was 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 included notification of the 30-day comment period for the EIA and BA Reports. The letter sent via postage also included an Executive Summary of the EIA and BA Reports and a Comment and Registration Form. Refer to Appendix E of this finalised EIA Report for proof of mailing and postage of the letters via registered mail, as well as the proof of email;
- It was noted in the Scoping Reports that a public meeting could possibly be held during the review of the EIA and BA 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 project, this was not deemed necessary. Telephonic consultations with key I&APs took place as required; and
- Meeting(s) with key authorities involved in decision-making for this EIA (if required and requested). These were not requested during the 30-day comment period.

The EIA and BA Reports were 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 were placed at the Kenhardt and Groblershoop local libraries for I&APs to access for viewing;
- Key authorities were provided with either a hard copy and/or CD of the EIA Reports;
- The EIA Reports were uploaded to the project website (i.e. <http://www.csir.co.za/eia/ScatecSolarPV/>).

Refer to Appendix E of this finalised EIA Report for a copy of the proof of receipt (i.e. courier waybills) of the CD and/or hard copies of the EIA Reports that were provided to key authorities, as well as the libraries.

### **TASK 2: COMMENTS AND RESPONSES TRAIL**

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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 have been documented:

- Written and emailed comments (e.g. letters and completed comment and registration forms);
- Telephonic communication with CSIR project team.

One-on-one meetings with key authorities and/or I&APs were not requested or required during the EIA Phase. The comments received during the 30-day review of the EIA Reports have been included in the Comments and Responses Trail (Chapter 6 of this finalised EIA Report), which has been submitted to the National DEA in terms of Regulation 23 (1) (a) for decision-making. The Comments and Responses Trail indicates the nature of the comment, as well as when and who raised the comment. The comments received have been considered by the EIA team and appropriate responses have been provided by the EIA team, Applicant and/or specialist. The responses provided indicate how the comments received have been considered in this finalised EIA Report for submission to the National DEA and in the project design or EMPR.

It is important to note and reiterate that during the 30-day review of the EIA Report, follow up email correspondence and telephonic follow ups (as required) were made to the SAHRA, SKA Project Office, Provincial Department of Environment and Nature Conservation, DAFF, DWS, Local and District Municipality, Transnet Freight Rail, SAEON, SANRAL, BirdLife South Africa, Southern African Large Telescope (SALT) Sutherland, Provincial Department of Agriculture, Land Reform and Rural Development, the South African Civil Aviation Authority (SACAA), the Department of Transport, the Endangered Wildlife Trust (EWT), BirdLife SA, and the Department of Mineral Resources in order to confirm if they had any comments on the EIA Report. Copies of these follow up emails are included in Appendix E of this finalised EIA Report. Despite these follow up correspondence, only the SKA Project Office, DWS and SAHRA submitted comments on the EIA Report. The DEA acknowledged receipt on 5 April 2016. A copy of this acknowledgement letter is included in Appendix I.5 of this finalised EIA Report.

### **TASK 3: COMPILATION OF EIA REPORTS FOR SUBMISSION TO THE DEA** **(Current Stage)**

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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) have been 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 finalised EIA Reports to the DEA for decision-making.

The finalised EIA Reports that are submitted for decision-making 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 (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) are to be placed on the project website (i.e. <http://www.csir.co.za/eia/ScatecSolarPV/>).

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**

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Subsequent to the decision-making phase, if an EA is granted by the DEA for the proposed projects, all registered I&APs and stakeholders on the project database will receive notification of the issuing of the EA 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 5 days of such decision. Regulation 4 (2) of the 2014 EIA Regulations stipulates that I&APs need to be informed of the EA 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 EA and the appeal procedure and its respective timelines.

The following process will be followed for the distribution of the EA (should such authorisation be granted by the DEA) and notification of the appeal period:

- Placement of one advertisement in The Gemsbok local newspaper to notify I&APs of the EA and associated appeal 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 EA;
- A copy of the EA will be uploaded to the project website (i.e. <http://www.csir.co.za/eia/ScatecSolarPV/>); and
- All I&APs on the project database will be notified of the outcome of the appeal period in writing.

### **4.6 Authority Consultation during the EIA Phase**

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Authority consultation is integrated into the PPP, with additional one-on-one meetings held with the lead authorities, where necessary. It was 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:

- 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;
- 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 Mgcawu 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. Site visits have not been requested yet.
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.

## 4.7 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.

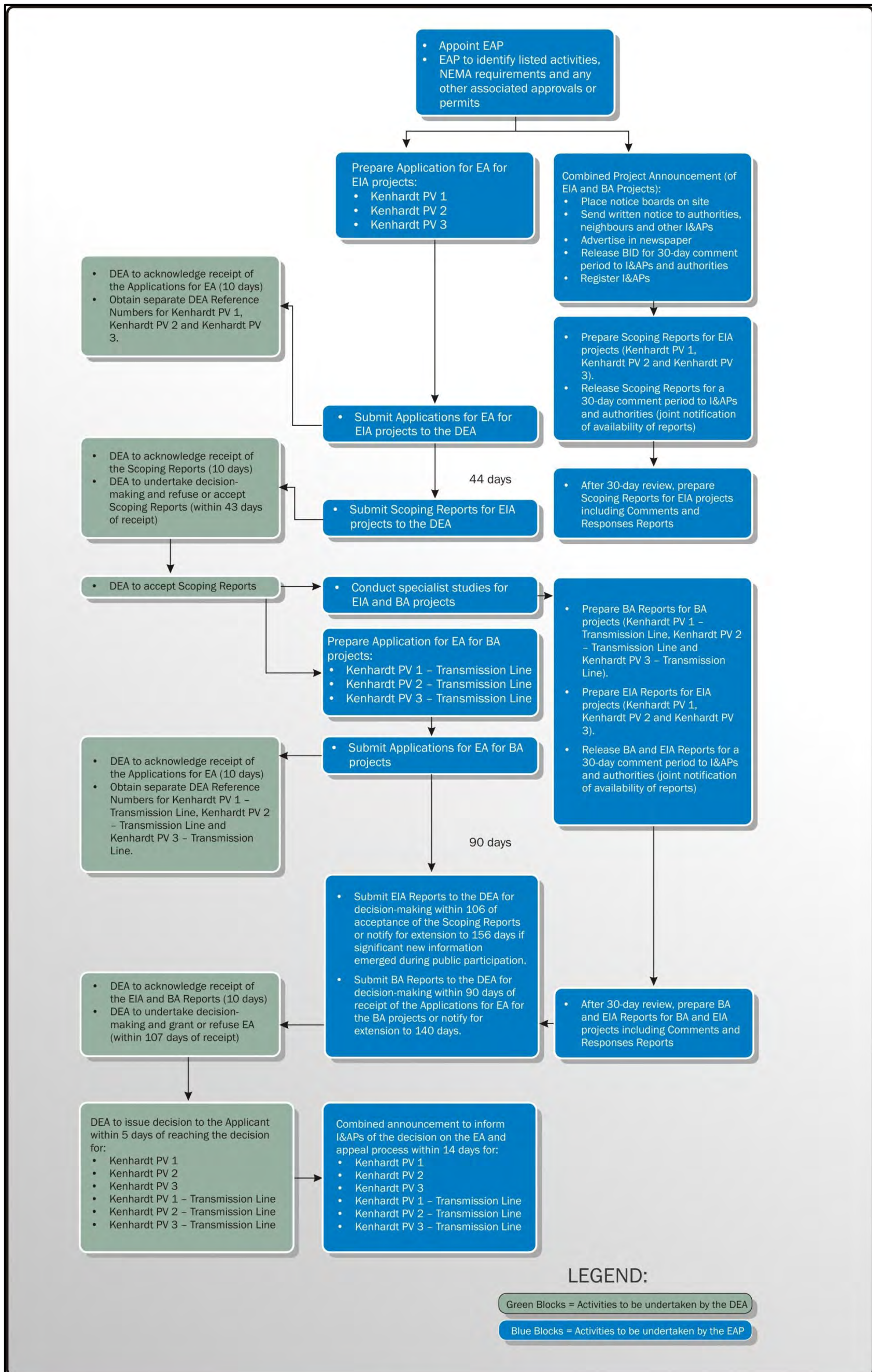


Figure 4.3: Joint PPP proposed for the Kenhardt PV EIA and BA Projects



**Table 4.5: Schedule for the Proposed Projects (including the Scoping and EIA Projects and the BA Projects)**

Task	July 2015				August 2015				Sept 2015				Oct 2015				Nov 2015				Dec 2015				Jan 2016				Feb 2016				March 2016				April 2016				May 2016				June 2016				July 2016				August 2016										
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4											
Project Announcement: Placement of Newspaper Advert, Distribute Letter 1, and Placement of Site Notice Boards. Release BID for 30-day comment period.				PPP	PPP	PPP	PPP																																																								
Prepare Scoping Reports and Plan of Study for EIA (PSEIA).				EAP	EAP	EAP	EAP																																																								
Prepare and Submit EIA Applications for EA to the DEA for Kenhardt PV 1, Kenhardt PV 2, and Kenhardt PV 3.											EAP																																																				
Release of Scoping Reports for 30-day I&AP and Organ of State Review.											PPP	PPP	PPP	PPP																																																	
Release of Addendum to the Scoping Reports for 30-day I&AP and Organ of State Review.												PPP	PPP	PPP	PPP																																																
Collate comments received and integrate into Scoping Reports.													EAP	EAP																																																	
Submission of Scoping Reports and PSEIA to DEA (within 44 days of receipt of the Applications for EA by the DEA).														EAP																																																	
DEA to Accept/Reject Scoping Reports or Refuse EA within 43 days of receipt of the Scoping Reports.															CA	CA	CA	CA																																													
Compile EIA Reports and BA Reports (including specialist studies and EMPRs).															EAP	EAP	EAP	EAP																																													
Prepare and Submit BA Applications for EA for Kenhardt PV 1 – Transmission Line, Kenhardt PV 2 – Transmission Line and Kenhardt PV 3 – Transmission Line.																																																															
Release of EIA Reports and BA Reports for a 30-day I&AP and Organ of State Review.																																																															
Collate comments received and integrate into EIA Reports and BA Reports.																																																															
Submission of EIA Reports and BA Reports to Competent Authority within 106 days of acceptance of the Scoping Reports by the DEA and within 90 days of receipt of the BA Applications for EIA by the DEA.																																																															
Competent Authority to Grant or Refuse EA (within 107 days of receipt of the EIA Reports and BA Reports).																																																															
Competent Authority to provide written feedback.																																																															
Notify I&APs of the EA decision.																																																															

\*\*An additional 50 days can be added to this phase under exceptional circumstances.

	EAP Timeframes
	PPP Timeframes
	Competent Authority Timeframes
	DEA Shutdown Period (15 December to 5 January)

## 4.8 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.

### 4.8.1 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 projects is well understood so that the impacts associated with the projects 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 CA to consider and come to a decision on the application, and must include an assessment of each identified potentially significant impact and risk, including -
  - (i) cumulative impacts;
  - (ii) the nature, significance and consequences of the impact and risk;
  - (iii) the extent and duration of the impact and risk;
  - (iv) the probability of the impact and risk occurring;
  - (v) the degree to which the impact and risk can be reversed;
  - (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
  - (vii) the degree to which the impact and risk can be mitigated.

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 Kenhardt PV 1 project) 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 4.6 below. The cumulative impacts will be assessed in terms of each proposed Kenhardt PV project as well. Cumulative effects associated with these similar types of projects include inter alia:

- Traffic generation;
- Avifaunal collisions and mortalities;
- Habitat destruction and fragmentation;
- Loss of agricultural land;
- Removal of vegetation;
- Increase in stormwater run-off and erosion;
- Increase in water requirements;
- Job creation;
- Increased interference to the SKA project;
- Social upliftment; and
- Upgrade of infrastructure and contribution of renewable energy into the National Grid.

**Table 4.6: 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 3km Loop In and Loop Out Lines.	The project received a positive EA on 21 February 2011. Site preparation for 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 Gemsbok PV1 75 MW Solar PV facility on the remaining extent of Portion 3 of the Farm Gemsbok Bult 120, Kenhardt, Northern Cape.	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 Gemsbok Bult (Remaining Extent of Portion 3 of Farm 120).	These projects are being undertaken in parallel (i.e. joint PPP) and are collectively referred to as the Nieuwehoop Solar Development. The Final EIA Reports have been submitted to the DEA for decision-making. The projects have received positive EA.
Proposed construction of Gemsbok PV2 75 MW Solar PV facility on the remaining extent of Portion 3 of the Farm Gemsbok 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 Gemsbok 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, Kenhardt, Northern Cape.	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).	
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.	
Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, north-east of	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.	The finalised Scoping Reports were submitted to the DEA for decision-making in November 2015 and were accepted by the

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
Kenhardt, Northern Cape.				DEA in December 2016 (refer to Appendix I.4 for the acceptance letter). The EIA Reports were released to I&APs for a 30-day comment period together with the BA Reports (extending from 3 March 2016 to 5 April 2016). The finalised EIA Reports are currently being submitted to the DEA for decision-making.
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 Gembok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	DEA Reference Number: 14/12/16/3/3/1/1547	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 Gembok 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 were released for a 30-day comment period together with the EIA Reports (extending from 3 March 2016 to 5 April 2016). The finalised BA Reports are currently being submitted to the DEA for decision-making.
Proposed development of a 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 Gembok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	DEA Reference Number: 14/12/16/3/3/1/1546	Scatec Solar intends to develop a 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 Gembok Bult Farm 120.	
Proposed development of a 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 Gembok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	DEA Reference Number: 14/12/16/3/3/1/1545	Scatec Solar intends to develop a 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 Gembok Bult Farm 120.	
Proposed construction of the Mulilo Solar Development	Mulilo Renewable Project	<ul style="list-style-type: none"> <li>DEA Reference Number:</li> </ul>	Mulilo Renewable Project Developments (Pty) Ltd proposes to construct and operate seven PV or	These projects are being undertaken in parallel (i.e. joint

Project Name	Applicant	DEA Reference Number	Brief project description	Phase
consisting of seven 75 MW PV OR Concentrated PV Solar Energy Facilities and associated infrastructure near Kenhardt, Northern Cape	Developments (Pty) Ltd	<p>14/12/16/3/3/2/841</p> <ul style="list-style-type: none"> <li>• DEA Reference Number: 14/12/16/3/3/2/842</li> <li>• DEA Reference Number: 14/12/16/3/3/2/843</li> <li>• DEA Reference Number: 14/12/16/3/3/2/844</li> <li>• DEA Reference Number: 14/12/16/3/3/2/845</li> <li>• DEA Reference Number: 14/12/16/3/3/2/846</li> <li>• DEA Reference Number: 14/12/16/3/3/2/847</li> </ul>	Concentrated PV Solar Facilities with a generating capacity of 75 MW each, on Portions 3 and 8 of Gembok 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 Gembok Bult Farm 120 and three projects on the Remaining Extent of Boven Rugzeer Farm 169. Each 75 MW Solar PV facility proposed will cover an approximate area of 200 ha with a collective footprint of approximately 1 400 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.	PPP). The BID was released to I&APs and authorities for a 30-day comment period in September 2015. The finalised Scoping Reports were submitted to DEA for decision-making in December 2015 and were accepted in February 2016. The EIA Reports are currently being released to I&APs for a 30-day comment period.

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 as follows against a predefined set of criteria (i.e. probability and consequence) as indicated in Figure 4.4:

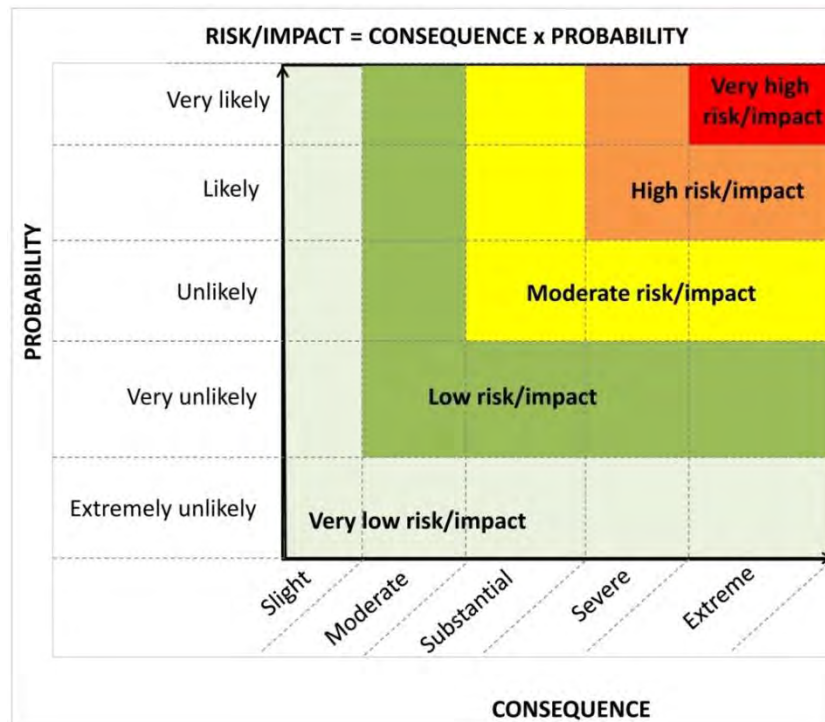


Figure 4.4: Guide to assessing risk/impact significance as a result of consequence and probability.

- **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 (Part 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 4.6); 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 4.7 is used by specialists for the rating of impacts.

**Table 4.7: 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		
<b>CONSTRUCTION PHASE (EXAMPLE)</b>													
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

## 4.9 TOR for the Specialist Studies

The TOR for the specialist studies essentially consist of the generic assessment requirements and the specific issues identified for each discipline. The TOR was updated to include minor relevant comments received from I&APs and authorities during the 30-day review of the Scoping Reports and Addendums. No comments were received during the EIA Phase that warranted the amendment of the specialist studies.

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 (as noted in the Plan of Study for EIA). However, it should be noted that the detailed scope and methodology of the specialist studies and impact statements 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 4.8 below.

**Table 4.8: Specialist Studies and Associated Specialists**

NAME	ORGANISATION	ROLE/STUDY TO BE UNDERTAKEN
Simon Bundy	Sustainable Development Projects cc	Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna)
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
Julian Conrad	GEOSS	Geohydrological Assessment
Johann Lanz	Private	Soils and Agricultural Potential Assessment
Rudolph du Toit	CSIR	Social Impact Assessment
Dr. P. S. van der Merwe and Dr. A. J. Otto	MESA Solutions (PTY) Ltd	EMI and RFI Studies

It should be noted that the Social 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. The review is included in Chapter 13 of this finalised 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. 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 interests 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 have been 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 positive EA.

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

#### ***4.9.1 Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna)***

The Ecological Impact Assessment was undertaken with the following broad TOR:

- Identification of baseline ecological parameters, based upon the floral and faunal state of the preferred site;
- Consideration of ecological drivers upon the proposed sites;
- 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.
- Consideration of mitigation or avoidance measures that may be employed to obviate negative impacts that are identified in the evaluation processes; and
- Final consideration of planning and layout, as well as operations, will be undertaken to assist with the employment of the abovementioned mitigation measures.

Overall, the study includes the following tasks:

- Review detailed information relating to the project description and precisely define the environmental risks to the terrestrial and aquatic environment (including avifauna) 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 (including avifauna) 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 site to record relevant data and to compile an overview of the habitat under review.
- Collate all data collected during the field work and undertake a statistical review using methodologies that allows 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).
- Undertake a faunal investigation on site based on the points identified during the preliminary aerial photographic interpretation.
- Incorporate relevant information from other specialist reports/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 proposed solar facilities, together with the impact of the proposed project.

- Provide input to the EMPr, including mitigation and monitoring requirements to ensure that the impacts on the terrestrial and aquatic ecology are limited.
- 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.

#### **4.9.2 Visual Impact Assessment**

The assessment follows the 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 have been referenced as part of the study.

The overall objectives of the Visual Impact Assessment specialist study are to identify and investigate potential visual impacts associated with the development of a large solar energy facility and its infrastructure near Kenhardt in the Northern Cape. The Visual Impact Assessment includes the following tasks:

- 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;
- Provide recommendations with regards to potential monitoring programmes;
- Determine mitigation and/or management measures which could be implemented to reduce the effect of negative impacts, or enhance the effect of positive impacts, as far as possible; and
- 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.

The Visual Impact Assessment has been undertaken in the following manner:

- Desktop Review and Analysis
  - Undertake a desktop review 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). This also provides a basis for evaluating the confidence levels for the overall assessment.
  - Use a GIS and available spatial data 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.
- Field Survey
  - Undertake a field survey and make use of the 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
  - Develop a Landscape Baseline and 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 have been 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 has been 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 provides 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 have been calculated for various components of the development, where possible. The viewsheds are 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.
- Impact Assessment, Mitigation and Report Writing
  - Identify and assess potential direct, indirect and cumulative visual impacts for the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facilities, together with the impact of the proposed project.
  - Compile a Visual Impact Assessment report that will focus on measures to reduce negative aspects, compensatory measures to offset negative aspects, and enhancement of positive aspects. Indicators for monitoring the efficacy of mitigation measures are suggested (for inclusion in the EMPr).

#### ***4.9.3 Heritage Impact Assessment (Archaeology and Cultural Landscape)***

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The following broad TOR has been specified for the Heritage Impact Assessment (including Archaeology and Cultural Landscape):

- 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 if any permits are required from the relevant Heritage Authority, in terms of the NHRA, for the proposed project activities.
- 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 facilities, together with the impact of the proposed project.

- Compile a report providing a review of archaeological heritage within the study area based on desktop study and new data from fieldwork and analysis.
- Provide recommendations and suggest appropriate mitigation measures (if required), for the recording, sampling and dating of any archaeological sites that could potentially be destroyed as a result of the proposed project.
- Provide recommendations and suggestions regarding archaeological heritage management on site, including conservation measures to ensure that the impacts are limited.
- Provide input to the EMP, including mitigation measures and monitoring requirements to ensure that the impacts on the archaeology are limited.

#### ***4.9.4 Desktop Palaeontological Impact Assessment***

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Based on the low palaeontological sensitivity of the area a desktop Palaeontology Impact Assessment has been conducted. The Palaeontology Impact Assessment identifies possible palaeontological sites or features by making use of desktop sources. The study assesses the significance of such sites, describes the possible impact of the proposed project on these sites and provides recommendations for mitigation or monitoring measures where applicable. The desktop study is conducted in accordance with the requirements of the NHRA.

#### ***4.9.5 Geohydrological Assessment***

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The following broad TOR has been specified for the Geohydrological Assessment:

- Conduct a desktop study and review relevant literature pertaining to the site, and project plan. Obtain borehole data from the National Groundwater Archive (NGA) and plan for the field investigation.
- Complete the field work (hydrocensus) at the sites. The objectives of the field works are to:
  - Locate the NGA boreholes and complete a borehole assessment;
  - Locate boreholes not yet recorded on the NGA and complete assessments; and
  - Collect anecdotal information from the land owners in the area as well as from discussions with the DWS geohydrologists.
- Analyze all the data and assess the impacts relating to the sites. Identify and rate potential direct, indirect and cumulative impacts of the proposed project (in terms of geohydrology) for the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of proposed solar facilities, together with the impact of the proposed project.
- Compile a report providing the results and findings of the investigation, potential risks, any potential mitigation measures, monitoring requirements as well as relevant recommendations.
- Provide input to the EMP, including mitigation measures and monitoring requirements to ensure that the impacts on the geohydrology are limited.
- Document the results in a report presenting the findings of the investigation, potential risks, any potential mitigation measures, monitoring requirements as well as relevant recommendations.

#### ***4.9.6 Soil and Agricultural Potential Assessment***

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The specialist study includes the following:

- Detailed assessment of soil conditions:
  - The EIA Phase assessment included a field investigation of soils and agricultural conditions across the site. This field investigation was aimed at ground proofing the existing land type information and understanding the specific soil and agricultural conditions and their variation on site.

- Assessment of erosion and erosion potential on site:
  - The field investigation included a visual assessment of erosion and erosion potential on site, taking into account the proposed development layout.
- 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.

The report fulfils 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 a 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.
- 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.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

#### **4.9.7 Social Impact Assessment**

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The Social Impact Assessment includes:

- 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 (negative and positive) associated with the construction, operational and decommissioning phases of the project.
- An identification of potential mitigation and enhancement measures.
- A specialist report which includes an assessment of the potential social impacts associated with the proposed project.
- An outline of mitigatory measures and additional management or monitoring guidelines.
- Provide input to the EMP, including mitigation and monitoring requirements to ensure that negative social impacts are limited.



#### 4.9.8 EMI and RFI Studies

- **Background to the Need for the EMI and RFI Studies:**

As noted above, the Astronomy Geographic Advantage (Act 21 of 2007) aims is to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and to provide for matters connected therewith.

The proposed project site falls within 20 km of a SKA station (SKA Station ID 2362), and according to the SKA Project Office, based on distance to the nearest SKA station, the location of the station, and the information currently available on the design of the proposed PV installation, the proposed facility poses a medium to high risk of detrimental impact on the SKA.

The SKA also recommended (as shown in Appendix G of this EIA Report) that any transmitters that are to be established at the site for the purposes of voice and data communication will be required to comply with the relevant Astronomy Geographic Advantage Act (Act 21 of 2007) (AGA Act) Regulations (currently out for public comment) concerning the restriction of use of the radio frequency spectrum that applies in the study area. Furthermore, the SKA Project Office recommended that further EMI and RFI studies be undertaken. In line with this, the Project Applicant has commissioned these studies and has appointed MESA Solutions (PTY) Ltd to conduct the RFI and EMI studies to determine the level of mitigation shielding required in order to comply with the SKA Regulations. The technical report is included in Appendix K of this EIA Report, with a summary provided in Chapter 15. This technical report aims to inform the potential impact that the proposed project will have on the SKA project and to determine suitable mitigation measures to manage the risk (if any) posed to the SKA project by the development of this project.

As noted above, the South African MeerKAT radio telescope, which is a precursor to the SKA telescope, is currently being constructed about 90 km north-west of Carnarvon in the Northern Cape Province. The telescope receivers of the SKA are sensitive and there is a risk that the infrastructure associated with the proposed Solar PV projects will desensitise the telescope receivers causing interference and/or loss of data. This interference is generally referred to as RFI.

As additionally noted above, the purpose of the AGA Act is to preserve the geographic advantage areas that attract investment in astronomy. The AGA Act also notes that declared astronomy advantage areas are to be protected and properly maintained in terms of RFI. The Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 projects fall within the Karoo Central Astronomy Advantage areas, which are protected against unnecessary EMI under the AGA Act.

In general, the dominating EMI produced by PV facilities are mainly in the form of switching noise from power electronics in the inverters or conditioning units, as well as clock signals from microprocessor control boards.

- **Scope of Work for the EMI and RFI Studies:**

A desktop analysis was undertaken to determine technology risks of the three proposed Solar PV facilities, as well as the identification of potential interference sources. A basic review and overview of the design of the proposed Solar PV facilities was undertaken, with the inclusion of mitigation recommendations to limit excessive RFI produced by the proposed facilities.

The detailed scope of work is included in the technical report (Appendix K of the EIA Report). It is important to note that the findings from EMI and RFI assessment was taken into account by the SKA Project Office during their own propagation analysis. The EMI and RFI assessment is therefore not meant to supersede any investigation done by SKA. If the specified emission limits are exceeded, the type of components used in the proposed PV facilities and the proposed manner of connection

will be reviewed to potentially alleviate the emission limits. Potential mitigation measures to reduce emission levels will be recommended as part of the final design.

The EMI and RFI studies include a cumulative assessment including all three proposed PV plants, as well as the proposed Nieuwehoop Solar Phase 1 and Phase 2 Development.

Refer to Section 4.3.1.8 of this chapter for additional information regarding comments received from the SKA Project Office.

#### 4.10 Key Milestones of the EIA Process

Key Milestones activities	Proposed Timeframe
Pre-Application Meeting with the DEA	17 September 2015
I&AP, Stakeholder and Authority Review of the Scoping Reports: 30 days	September 2015 - October 2015
I&AP, Stakeholder and Authority Review of the Addendums to the Scoping Reports: 30 days	October 2015 - November 2015
Submit Scoping Reports to the DEA for Decision-making.	November 2015
Review of the Scoping Reports by the DEA (i.e. accept or refuse EA): 43 days since receipt of the Scoping Reports.	November 2015
I&AP, Stakeholder and Authority Review of the EIA Reports: 30 days	March 2016 - April 2016
Submit EIA Reports to the DEA for Decision-making.	April 2016 (Current Stage)
Review of the EIA Reports by the DEA (i.e. grant or refuse EA): 107 days since receipt of the EIA Reports.	April 2016 - July 2016/August 2016
Next steps: 5 days for notification to applicant	

# EIA REPORT



## CHAPTER 5: Project Alternatives

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

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## 5 APPROACH TO THE ASSESSMENT OF ALTERNATIVES

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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; or
- operational aspects of the activity; and
- includes the option of not implementing the activity”.

The following objectives apply to the consideration of alternatives during the Scoping Phase (as indicated in Appendix 2 of the 2014 EIA Regulations):

- 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 24(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

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#### 5.1.1 No-go Alternative

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The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Kenhardt PV 1 project. This alternative would result in no environmental impacts on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report. The following implications will occur if the “no-go” alternative is implemented:

- 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 20 000 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 CO<sub>2</sub> emissions and water consumption;
- Electricity generation will remain constant (i.e. no additional renewable energy generation will occur on the proposed site) and the local economy will not be diversified;
- 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. Between 90 and 150 skilled and 400 and 460 unskilled employment opportunities are expected to be created during the construction phase. Approximately 20 skilled and 40 unskilled employment opportunities will be created over the 20 year lifespan of the proposed facility;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised; and
- 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.

Converse to the above, the following benefits could occur if the “no-go” alternative is implemented:

- There will be no development of solar energy facilities at the proposed location;
- Only the agricultural land use will remain;
- No threatened vegetation will be removed or disturbed during the development of these facilities;
- No change to the current landscape will occur;
- No additional transmission lines and additional electrical infrastructure will be constructed; and
- No additional water use during the construction phase and the cleaning of panels during the operational phase.

It is important to take into account that 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 this finalised EIA Report, the purpose of the proposed Kenhardt PV 1 project 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).

Hence, while the “no-go” alternative will not result in any negative environmental impacts; it will also not result in any positive community development or socio-economic benefits. 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. Hence the “no-go” alternative is not a preferred alternative.

## 5.1.2 Land-use Alternatives

### 5.1.2.1 Agriculture

At present the proposed site is zoned for agricultural land-use, and is mainly used for livestock grazing. As noted in Chapter 3 of this finalised 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 site. Hence, agricultural land use is not a preferred alternative. A Soils and Agricultural Potential Assessment has been conducted as part of the EIA Phase (Chapter 12 of this EIA Report) in order to assess the potential impacts of the proposed development on soils and agricultural potential. 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. 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 (Chapter 12 of this EIA Report). Hence, **the sole use of the land for agriculture is not a preferred alternative.**

### 5.1.2.2 Renewable Energy Alternatives

Where the “activity” is the generation of electricity, possible reasonable and feasible land-use alternatives for the proposed properties 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 to be an **unfeasible and unreasonable 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 facility.



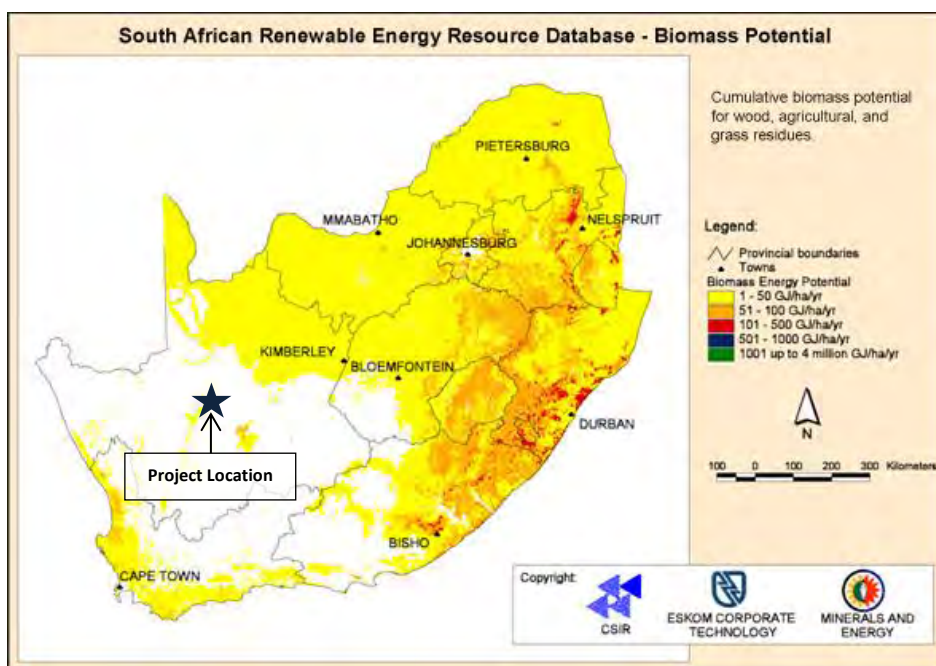


Figure 5.1: Biomass Potential (Source: SARERD)

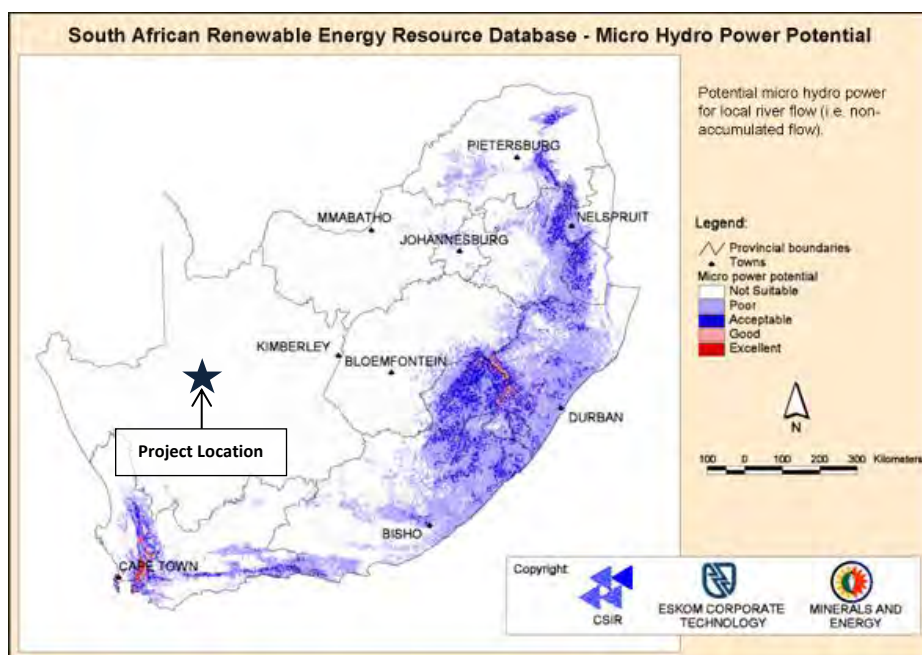


Figure 5.2: Micro Hydro Power Potential (Source: SARERD)

- **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.

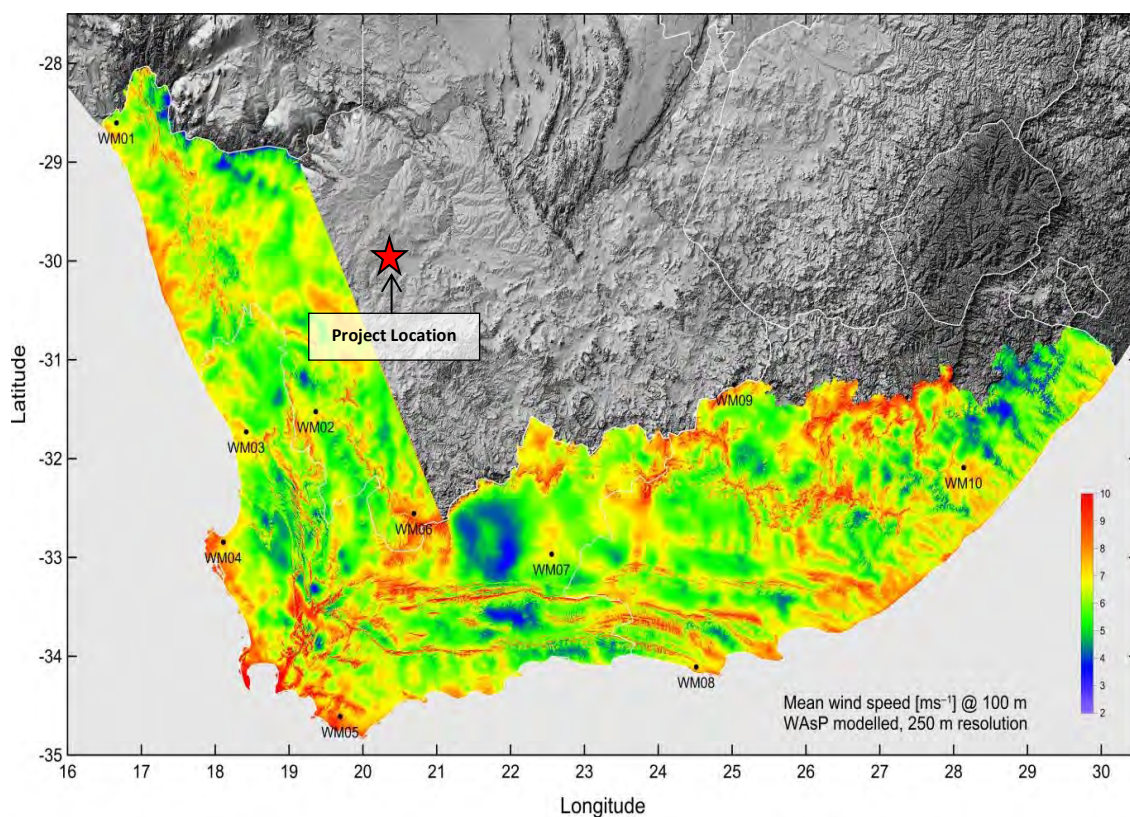


Figure 5.3: Representation of Mean Wind Speed ( $\text{ms}^{-1}$  at 100 m) (Source: WASA, 2014)

▪ **Solar Energy**

• *National Level Considerations: Solar Radiation*

The north-western part of South Africa has the highest Global Horizontal Irradiance<sup>1</sup> (GHI), relevant to PV installations (Figure 5.4) and Direct Normal Irradiance<sup>2</sup> (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 1500 kWh/m<sup>2</sup> and 1700 kWh/m<sup>2</sup> 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 2300 kWh/m<sup>2</sup> per annum, which is the highest level. Various developers have received several approvals for 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 Kenhardt PV 1 project is deemed the most suitable for the construction and operation of solar energy facilities.**

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

<sup>2</sup> 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.

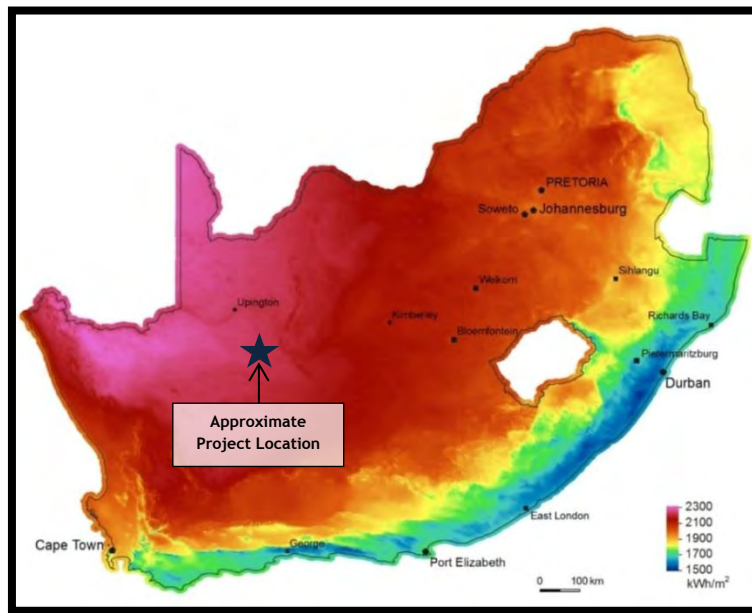


Figure 5.4: Solar Resource Availability in South Africa (Source: SolarGIS map© 2013 GeoModel Solar).

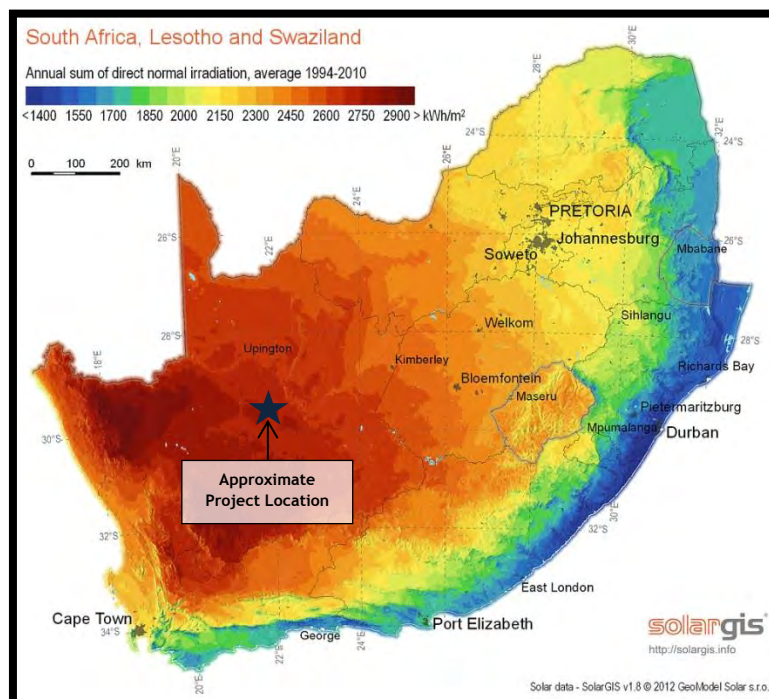


Figure 5.5: Direct Normal Irradiation of South Africa (Source: SolarGIS map© 2014 GeoModel Solar).

- REIPPPP and SEA 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 3725 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 6300 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 3040 MW, 2200 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 finalised EIA Report, to this end, the National DEA, in discussion with the DOE, has been mandated by MinMec to undertake a SEA<sup>3</sup> to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Wind and Solar PV SEA is in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. 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. Through the identification of the REDZs, the key objective of the SEA 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 access<sup>4</sup>. Following the completion of the SEA, the proposed REDZs, shown in Figure 5.6, will be submitted for Cabinet approval for the rollout of solar PV energy in the Northern Cape, Eastern Cape, Western Cape and Free State provinces.

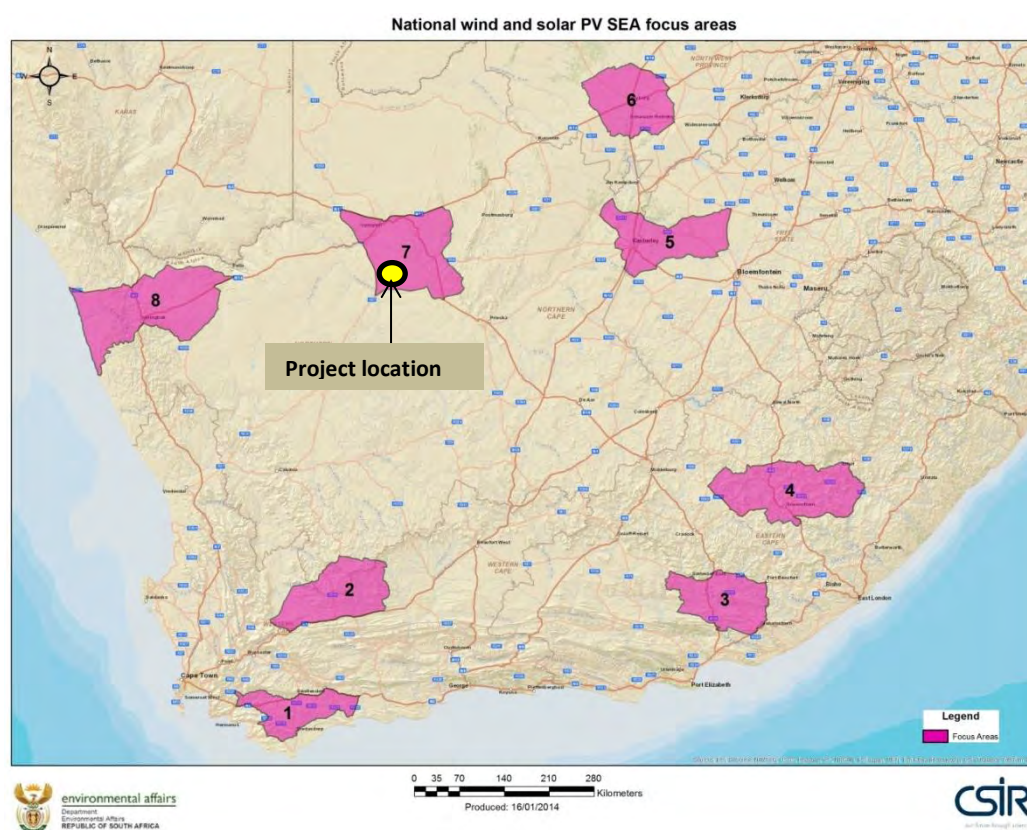


Figure 5.6: Renewable Energy Development Areas identified in the Strategic Environmental Assessment (the proposed project falls within the REDZ 7 (Upington)) (REDZ 1: Overberg; REDZ 2: Kromberg; REDZ 3: Cookhouse; REDZ 4: Stormberg; REDZ5: Kimberley; REDZ 6: Vryburg; REDZ 7: Upington; REDZ 8: Springbok).

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

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

As previously noted, the proposed solar facility currently falls within the REDZ 7. 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, the proposed development still requires site specific assessments as per the site protocol (still in development and not yet promulgated) in order to determine the potential impacts of a project at a local and site specific level.

Therefore, the implementation of a solar energy facility at the proposed project site is more favourable and feasible than other alternative energy facilities (i.e. for generating 20 MW or more from a renewable resource). Therefore in terms of project and location compatibility, the proposed solar facility is considered to be the most feasible renewable energy land use alternative. Since these alternative land-uses were deemed unsuitable for the area, these technologies have not been further assessed during the EIA Phase. Only solar energy has been assessed as part of 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 that the Project Applicant has 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 project on the remaining extent of Onder Rugzeer Farm 168 will result in fewer risks and low significance impacts in comparison to the implementation of wind energy, hydro power and biomass. The risks and impacts are described in Table 5.1 below.

**Table 5.1: Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives**

Type of Renewable Energy	Potential Impacts and Risks
Biomass Energy	<ul style="list-style-type: none"> <li>▪ Based on the SARERD, the project site has no cumulative biomass energy potential. Therefore, a biomass facility will be unfeasible at the proposed project site. If a biomass facility was to be constructed instead of a solar facility, it will create significant negative socio-economic implications as it would not be feasible in terms of operations. It will most likely use valuable municipal resources without contributing to the local economy in a beneficial manner. A biomass facility is also likely to result in unnecessary pollution due to waste generation (especially waste water generated during the operational phase of the biomass facility), traffic impacts and air emissions as a result of operations. A biomass facility is likely to create traffic impacts as the material required for the plant (i.e. biomass) would need to be transported to the site on a regular basis during the relevant seasons.</li> </ul>
Hydro Energy	<ul style="list-style-type: none"> <li>▪ Based on the SARERD, the project site is not suitable in terms of hydro energy potential. Hydro power is also not noted as a renewable energy source in terms of the municipal IDP. As with biomass, a hydro power facility will be unfeasible and not possible at the proposed project site. If a hydro power was to be constructed instead of a solar facility, it will create significant negative socio-economic implications as it would not be feasible in terms of operations.</li> </ul>
Wind Energy	<ul style="list-style-type: none"> <li>▪ Wind energy facilities require that wind turbines are spaced a significant distance from one another. Due to the fact that there is only a certain amount of land available for development, the implementation of a wind energy facility would not make optimum use of that land which is available.</li> <li>▪ The total development area required for the implementation of a wind energy project is much higher than that required with a solar energy facility, resulting in additional potential environmental impacts (such as soil erosion, impacts on nearby watercourses and impact on the geohydrology).</li> <li>▪ A wind facility would generate additional noise during the operational phase as compared to a solar energy facility.</li> <li>▪ The average wind speeds or wind resources at the proposed sites are not favourable for the development of a wind energy facility at the sites.</li> </ul>

Type of Renewable Energy	Potential Impacts and Risks
Solar Energy	<ul style="list-style-type: none"> <li>▪ The solar resources available across the proposed project site are better and represent a higher yield than the biomass, hydro or wind resources available across the same site.</li> <li>▪ The proposed solar facility currently falls within the REDZ 7, which is an area of strategic importance for large scale Solar PV development (as discussed above and in Chapter 1 of this EIA Report).</li> <li>▪ There is a possibility that the proposed solar energy facility will still provide an opportunity for the current land use (i.e. grazing) to continue during operations. Additional information regarding the agricultural potential of the site is provided in Chapter 12 of this EIA Report.</li> <li>▪ Additional potential impacts relating to the proposed Kenhardt PV 1 project are noted in the relevant specialist studies that are included Chapters 7 to 14 of this EIA Report.</li> </ul>

Table 5.2 also presents a summary and an evaluation matrix for the possible land-use alternatives with regards to resource suitability and availability, strategic alignment, and potential risks and impacts.

**Table 5.2: Summary of Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives**

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site?	Is there Strategic Alignment?	Main Potential Impacts and Risks	Is this the preferred Alternative?
Biomass Energy	<ul style="list-style-type: none"> <li>▪ No - not suitable</li> </ul>	<ul style="list-style-type: none"> <li>▪ No</li> </ul>	<ul style="list-style-type: none"> <li>▪ Significant Waste Generation</li> <li>▪ Air Emissions</li> </ul>	<ul style="list-style-type: none"> <li>▪ No</li> </ul>
Hydro Energy	<ul style="list-style-type: none"> <li>▪ No - not suitable</li> </ul>	<ul style="list-style-type: none"> <li>▪ No</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not suitable</li> </ul>	<ul style="list-style-type: none"> <li>▪ No</li> </ul>
Wind Energy	<ul style="list-style-type: none"> <li>▪ No</li> </ul>	<ul style="list-style-type: none"> <li>▪ No</li> </ul>	<ul style="list-style-type: none"> <li>▪ Visual</li> <li>▪ Noise Generation</li> <li>▪ Bird and bat collisions</li> </ul>	<ul style="list-style-type: none"> <li>▪ No</li> </ul>
Solar Energy	<ul style="list-style-type: none"> <li>▪ Yes - 2100 - 2300 kWh/m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes - REDZ 7</li> </ul>	<ul style="list-style-type: none"> <li>▪ Visual</li> <li>▪ Impacts on heritage resources</li> <li>▪ Impacts on avifauna, aquatic ecology and terrestrial ecology</li> <li>▪ Additional impacts are included in the specialist studies (Chapters 7 to 14 of this EIA Report)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Yes - REDZ 7</li> </ul>

### 5.1.3 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 was assumed that the “site” referred to in the 2014 EIA Regulations is the farm or land portions on which proposed location alternatives were considered for the proposed project (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 and alternative sites within the Northern Cape were 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 sites currently fall 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, 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.

#### 5.1.3.1 Site Specific Considerations

On a local (site specific) level, the site selection process took into account the following factors shown in Table 5.3.

**Table 5.3: Site selection factors and suitability of the site**

FACTOR	SUITABILITY OF THE PREFERRED SITE
Land Availability	The remaining extent of Onder Rugzeer Farm 168 is of a suitable size for the proposed project. The land available to develop at the preferred site for Kenhardt PV 1 extends approximately 450 ha, however only an estimated 250 ha will be required for the proposed project (i.e. Kenhardt PV 1).
Irradiation Levels	2100 - 2300 kWh/m <sup>2</sup> (as shown in Figure 5.4)
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, <i>inter alia</i> , the following within the existing development footprint of the Nieuwehoop Substation: <ul style="list-style-type: none"> <li>- 2 x 400 kV transformer feeder bay;</li> <li>- A 400 / 132 kV transformer;</li> <li>- 132 kV busbar;</li> <li>- 400 / 132 kV 500 MVA x 3 transformers; and</li> <li>- 8 x 132 kV feeder bays and associated lines.</li> </ul> <p>The proposed project will be located approximately 3-4 km from the Eskom Nieuwehoop Substation.</p>
Site Accessibility	The proposed project site can be accessed via an existing gravel road and the existing Transnet Service Road (private). The existing gravel road can be accessed from the R383 Regional Road via the R27 National Road. The R27 extends from Keimoes (in the north) to Vredendal in the south. The Transnet Service Road can be accessed from the R27. Internal gravel roads will be constructed as part of the proposed project (as discussed in Chapter 2 of the EIA Report).
Topography	Slope $\leq 2\%$ (Level to very gentle slope).
Fire Risk	Main vegetation type is Bushman arid grassland, low fire risk.
Current Land Use	Agriculture - Grazing
Landowner Willingness	The landowner has signed consent for the use of the land for the proposed projects. This is considered an important aspect of the proposed project in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowner is willing and supportive of the proposed projects being undertaken on the farm).

Furthermore, from an impact and risk assessment perspective, the implementation of a solar PV project on the remaining extent of Onder Rugzeer Farm 168 will result in fewer risks in comparison to its implementation at the 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. Site geotechnical conditions, topography, fire potential and ready access to a site 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 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 away a project is from the grid, the higher the potential for significant environmental and economic impacts.

As previously noted, the proposed Kenhardt PV 1 facility is one part of a bigger project by Scatec Solar to develop three Solar PV Facilities in total. The main determining points for Scatec Solar was to find suitable, developable land in one contiguous block to optimise design, minimise costs, and minimise sprawling development and impact footprints. In addition, the proximity to the Eskom Nieuwehoop Substation was a major determinant for identifying suitable sites for the proposed development.

Given the site selection requirements associated with solar energy facilities and the suitability of the land available on the remaining extent of Onder Rugzeer Farm 168, no other site alternatives have been considered in the EIA Phase.

#### **5.1.4 Location Alternatives**

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Figure 5.7 shows the location alternatives that were initially considered by the Applicant during the Scoping Phase for all three PV facilities, 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 each Solar PV project), which has been assessed as part of separate BA Processes. The alternative site (assessed during the Scoping Phase) and the preferred site are suitable in terms of size requirements, i.e. larger than 250 ha which is required for the proposed Kenhardt PV 1 facility and still falls within the boundaries of the remaining extent of Onder Rugzeer Farm 168 which, as discussed above, has been deemed a suitable site for the proposed development.

As shown in Figure 5.7 and discussed in Chapter 1 of this EIA Report, the current project proposal is one of three PV projects proposed on site. As noted above, the proximity of the two site locations (preferred and alternative) for the Kenhardt PV 1 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 the desktop assessment undertaken to identify the sensitivities on site, both site localities (i.e. the alternative site that was assessed at the Scoping Phase and the preferred site) are expected to be fairly homogenous in terms of environmental features on site. 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 16) are able to be avoided by the location, layout and design of the project. A preliminary site layout is provided in Chapter 16 and Appendix J of this EIA Report, which avoids all the environmental sensitivities identified on site. Chapter 3 of this EIA Report also provides high-level input from the specialists in terms of a description of the alternative site that was considered during the Scoping Phase (i.e. Kenhardt PV 1b).



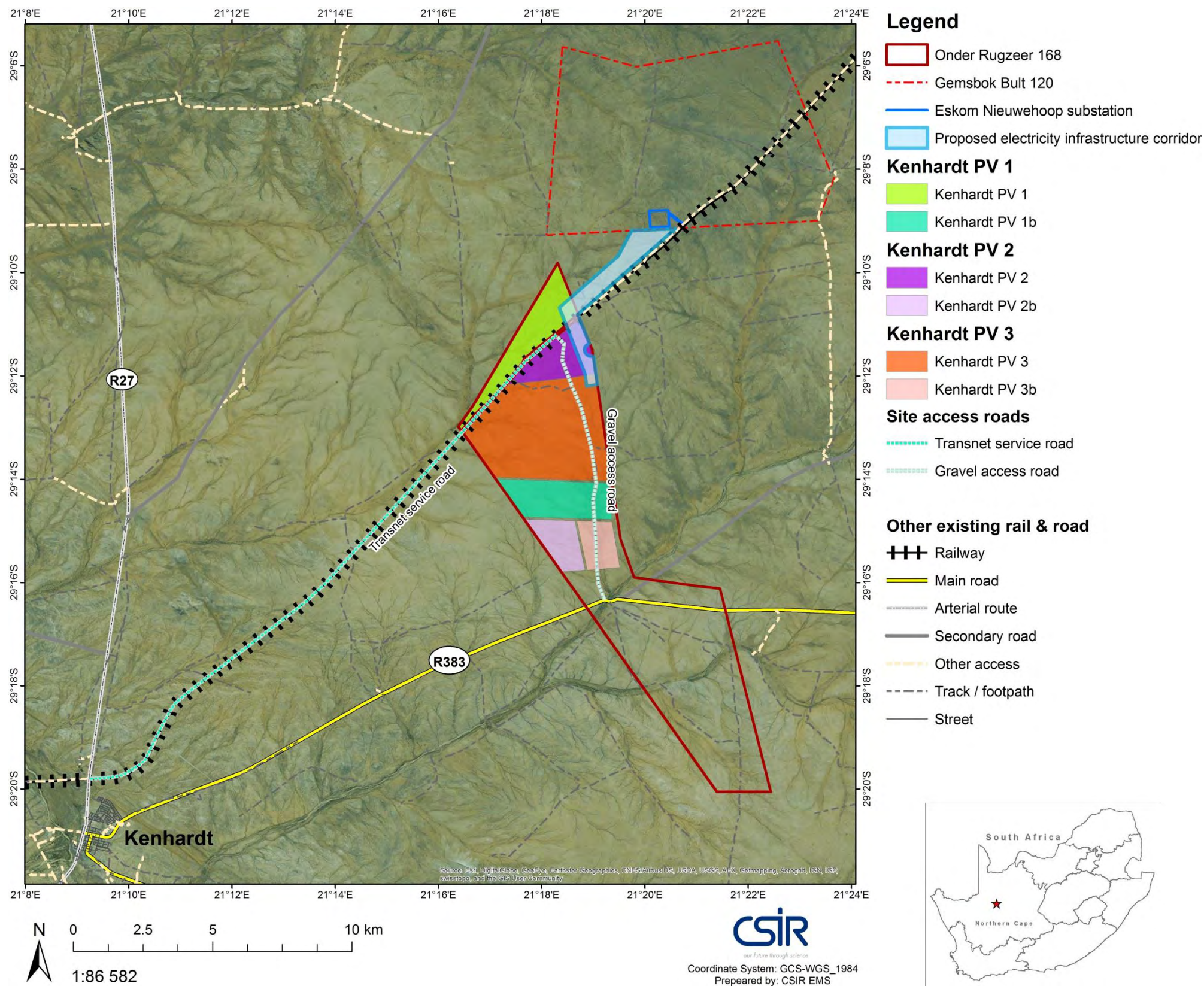


Figure 5.7: Scatec Solar Kenhardt PV 1, Kenhardt PV 2, and Kenhardt PV 3 projects, as well as the alternative PV sites (that were considered during the Scoping Phase) and the electricity infrastructure corridor for the proposed transmission lines (which has been assessed separately as part of the BA Processes).

Therefore, the preferred site (i.e. Kenhardt PV 1) is favoured for the proposed project based on the following:

- The alternative Kenhardt PV 1b site (that was assessed during the Scoping Phase) is located too far south from the Eskom Nieuwehoop Substation, which therefore significantly reduces the financial viability of the proposed project as additional costs are required for longer transmission lines. Longer power lines may also result in additional environmental impacts. Therefore, the closer the site is to the Eskom Nieuwehoop Substation will reduce potential economic and environmental impacts, and improve the feasibility of the proposed project.
- The alternative site (that was assessed during the Scoping Phase) is located closer to the landowner's residence, therefore it would be better to locate the proposed PV facility a greater distance from the farm house (i.e. at the preferred site) to enable a certain level of privacy.
- The alternative site (that was assessed during the Scoping Phase) lies closer to the main public road (i.e. R383), resulting in safety concerns, higher visual intrusion on the sense of place and increased risk of theft during the construction and operational phases.

As noted above, the preferred site includes approximately 450 ha of land. The proposed project only requires approximately 250 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 Kenhardt PV 1 facility on the preferred site is discussed in Chapter 16 of this EIA Report, whereby the sensitive features identified are avoided by the proposed layout, together with 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 5.4 below indicates the requirements of the 2014 EIA Regulations in terms of the process leading to the preferred site and location alternatives. Table 5.4 also includes a response from the EAP showing how the requirements of the 2014 EIA Regulations have been addressed in this report.

**Table 5.4: 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"> <li>▪ 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.</li> </ul>	As noted in the preceding chapters of this EIA Report, the preferred site for the proposed Kenhardt PV 1 project extends approximately 450 ha. However, the proposed solar facility and associated infrastructure requires a development area of approximately 250 ha only. 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 16 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 Kenhardt PV 1 area (of approximately 450 ha). The buffers and exclusion areas that need to be applied to the sensitive areas (as identified in the

	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
			<p>specialist studies) have also been mapped and overlain by the Kenhardt PV 1 area (of approximately 450 ha). 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 250 ha site has been determined (as discussed in Chapter 16 of this EIA Report), ensuring that the areas that have a high environmental sensitivity will be avoided by the proposed siting of the proposed PV facility. A single suitable location for the proposed 250 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 16 of this report includes a detailed discussion on 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 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.</p>
3.	Appendix 3 - (2) (d)	<ul style="list-style-type: none"> <li>▪ 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.</li> </ul>	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"> <li>▪ identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment.</li> </ul>	Refer to the Development Envelope and sensitivity mapping approach described in Point 2 above.
5.	Appendix 3 - (2) (f)	<ul style="list-style-type: none"> <li>▪ identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity.</li> </ul>	The specialist studies included in Chapters 7 to 14 of this EIA Report include a description, identification and assessment 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"> <li>▪ identify suitable measures to avoid, manage or mitigate identified impacts.</li> </ul>	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"> <li>▪ identify residual risks that need to be managed and monitored.</li> </ul>	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

	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
			monitored.
8.	Appendix 3 - (3)(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including - <ul style="list-style-type: none"> <li>▪ (i) details of the development footprint alternatives considered;</li> <li>▪ (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</li> <li>▪ (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;</li> <li>▪ (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and</li> <li>▪ (x) a concluding statement indicating the preferred alternative development location within the approved site.</li> </ul>	Refer to the Development Envelope and sensitivity mapping approach described in Point 2 above.
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.
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.

## 5.1.5 Technology Alternatives

### 5.1.5.1 Solar Panel Types

Only the PV solar panel type is considered in 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 will not be considered further. This is the main difference between PV and CSP technology that led to the selection of PV as the preferred solar panel technology. Furthermore, CPV technology therefore requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective. 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.

### 5.1.5.2 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:

- Single axis tracking systems;
- Fixed axis tracking systems;
- Dual axis tracking systems; and
- Fixed Tilt Mounting Structure.

The above mounting systems have been considered during the EIA Phase. Additional information regarding the mounting system is provided in Chapter 2 of this EIA Report.

### 5.1.6 *Layout Alternatives*

As noted above, the Rochdale Envelope Approach<sup>5</sup> was applied to determine the preferred Development Envelope for the proposed PV facility. The Rochdale Envelope approach is named after two legal cases relating to a proposed business park in Rochdale in the United Kingdom. These cases considered applications for outline planning consent in the context of preparing an EIA. The goal of the Rochdale Envelope approach is to allow for an EIA to be undertaken, based on the 'worst case scenario', whereby the Competent Authority granting the EA will then decide whether, based on this 'worst case scenario', the environmental impacts are acceptable.

This approach is very useful since normally an EIA is undertaken prior to the technical assessment of the site which would consider the exact placement of, for example, the solar panels and associated infrastructure. The main principle behind this approach is that, should the development fall within the parameters set within this "envelope", as determined by the EIA Process, the placement of the different components could be determined at a later stage provided that the components fall within the parameters of the envelope. This approach therefore allows for flexibility to the developer during the detailed design phase in terms of engineering, design and construction parameters.

As part of the EIA, a larger 450 ha area was assessed by the specialists and considered during this EIA. The determination of the buildable area for the project is discussed above, as well as in Chapters 1 and 2. The Development Envelope has been determined for the project based on the environmental sensitivities present on the site, which is discussed further in Chapter 16 of this EIA Report. Based on the findings of the specialist studies, an environmental sensitivity map has been produced (and included in Chapter 16 and Appendix J of this EIA Report). This map shows the sensitivities on site (terrestrial, aquatic, and sensitive heritage features) within the larger 450 ha buildable area that was assessed. Based on this map, the preferred location for the 250 ha Kenhardt PV 1 facility (i.e. Development Envelope), avoids the sensitive features that were identified by the specialists within the original 450 ha buildable area. Based on the boundaries of the Development Envelope and the constraints of the environmental sensitivities, a site layout has also been preliminary determined for this project (Appendix J of this EIA Report). It is important to note that should the layout change subsequent to the issuing of an EA (should such authorisation be granted), any alternative layout or revisions to the layout occurring within the boundaries of the Development Envelope would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the EIA Phase. This is based on the understanding that the specialists have assessed the larger area and have identified sensitivities, which have been avoided in the siting of the proposed infrastructure. The Development Envelope is considered to be a "box" in which the project components can be constructed at whichever location without requiring an additional assessment or change in impact significance. Any changes to the layout within the boundaries of the Development Envelope following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

Therefore, the findings of the specialist studies have been used to inform the layout of the proposed facility within the preferred site, Kenhardt PV 1. As noted above, the specialist studies conducted during the EIA Phase have identified the various environmental sensitivities present on site that should be avoided, which were taken into account in the layout of the PV facility.

<sup>5</sup> Infrastructure Planning Commission (IPC), Using the 'Rochdale Envelope'. February 2011

## 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. Kenhardt PV 1b). Refer to the finalised Scoping Report for the methodology adopted and the findings of the assessment.

The high-level Scoping Phase assessment concluded that the preferred site for the project on the Remaining Extent of the Onder Rugzeer Farm 168 is the **Kenhardt PV 1** site. The preferred site was selected for assessment in the EIA Phase due to the proximity to the Eskom Nieuwehoop Substation and the reduction in overall infrastructure cost to connect to the substation via the preferred site compared to the alternative site.

## 5.3 Concluding Statement of Preferred Alternatives

Based on the aspects considered in this chapter, the following concluding statement has been provided in terms of the preferred alternatives that have been considered in the EIA Phase:

- **Development of the Kenhardt PV 1 project, using Horizontal Single Axis Tracking, Fixed Axis Tracking, Dual Axis Tracking, OR Fixed Tilt Mounting Structures on the preferred site, close to the Eskom Nieuwehoop substation, and the preferred location, the Remaining Extent of Onder Rugzeer Farm 168. The final layout of the facility has been informed by specialist studies during the EIA Phase to avoid environmental sensitivities as far as possible.**

In summary, the following alternatives have been taken forward into the EIA Phase:

- **No-go Alternative:**
  - The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed Kenhardt PV 1 facility. This alternative would result in no environmental impacts on the site or surrounding local area, as a result of the facility. It provides a baseline against which other alternatives can be compared to and considered during the EIA Phase.
- **Land Use Alternative:**
  - No other renewable energy technologies were deemed to be appropriate for the site and therefore these technologies will not be further assessed during the EIA Phase. The implementation of a solar energy facility at the proposed project site is more favourable than other alternative energy facilities due to the following:
    - The solar resources available across the proposed project site are better and represent a higher yield than the biomass, hydro or wind resources available across the same site;
    - Wind energy facilities require that wind turbines are spaced a significant distance from one another. The implementation of a wind energy facility would not make optimum use of the land which is available; and
    - The proposed solar facility currently falls within the REDZ 7 which has been identified by the DEA SEA as being of strategic importance for Solar PV development (as discussed in Chapter 1 and Chapter 2 of this EIA Report).
- **Preferred Site and Site Location:**
  - The preferred site for the project is the Remaining Extent of the Onder Rugzeer Farm 168 and the Kenhardt PV 1 site; and
  - The available development areas of each of the above locations exceed 250 ha, which is the approximate area required for each solar PV project.

- **Technology Alternatives:**
  - Applicable and relevant technology options are described in Chapter 2 of this EIA Report, such as those relating to the mounting system.
  
- **Layout Alternatives:**
  - Layout alternatives for the project were determined following the input from the various specialists by establishing the Development Footprint. The studies identified various environmental sensitivities present on the preferred sites that should be avoided, which have been taken into account during the determination of the layout of the PV facility. Additional information regarding the development envelope and the layout of the facility is provided in Chapter 16 of this EIA Report.
  - The use of the existing Transnet Service Road or the unnamed farm road also is also discussed in Chapter 2 of this EIA Report. Both access roads have been considered and included in the project description. The access road that will be selected during construction is dependent on the discussions between the Project Applicant and Transnet.

# EIA REPORT



## CHAPTER 6:

### Comments and Responses Trail

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province



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

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## 6 COMMENTS AND RESPONSES TRAIL

It is important to note that no comments were raised by stakeholders, I&APs or Organs of State following the submission of the finalised Scoping Report to the DEA for decision-making (in November 2015) and prior to the release of the EIA Report for a 30-day review period (extending from 3 March 2016 to 5 April 2016). This chapter presents the comments that were raised by stakeholders, I&APs and Organs of State during the preceding Scoping Phase, and how these comments have been addressed in this EIA Phase. As such, the responses to some of the comments raised have been updated, where required. Comments raised by stakeholders, I&APs and Organs of State during the 30-day review of the EIA Report are also included in this chapter, along with responses thereto.

### 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 6.1):

- Whether or not the issue falls within the scope and responsibility of the proposed Kenhardt PV 1 project;
- Whether or not sufficient information is available to respond to the issue raised without further specialist investigation.

Issues were sourced by the EIA team based on the following Scoping and EIA Phase 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 EIA consultant about specific issues or interests in the proposed project, the project and EIA Process was advertised in one local newspaper (i.e. The Gemsbok) on 29 July 2015 during the Scoping Phase. To inform the public and stakeholders of the release of the EIA Report for the 30-day review period in March 2016, an advertisement was also placed in The Gemsbok on 2 March 2016. The Gemsbok is a weekly newspaper which is distributed every Wednesday and made available from Wednesday to Friday; however it is dated for a Friday (in this case, 31 July 2015 and 4 March 2016). The newspapers were distributed on 29 July 2015 (during the Project Initiation Phase) and 2 March 2016 (upon the release of the EIA Report). A copy of the newspaper advertisements is included in Appendix D of this EIA Report.
- **Email and Postage** - Issues were sent to the CSIR via email correspondence and postage during the Project Initiation Phase (in response to the review of the BID), during the 30-day review of the Scoping Report, as well as during the 30-day review of the EIA Report.
- **Comment Form** - issues submitted to the CSIR via the Comment and Registration Form that was provided with Letter 1 (dated 30 July 2015) and the BID mailed to I&APs, with Letter 2 (dated 25 September 2015) mailed to I&APs (which included an Executive Summary of the Scoping Report), and with Letter 3 (dated 4 March 2016) mailed to I&APs (which included an Executive Summary of the EIA Report).

All comments received during the 30-day review of the BID, the 30-day review of the Scoping Report and the 30-day review of the EIA Report are included in the Comments Trail below, as well as in Appendix G of this EIA Report. Section 6.2 below provides a summary of the comments received prior to the 30-day review of the Scoping Report, and they have been grouped according to the following categories (the number in brackets indicates the number of issues raised):

- EIA Process and Public Participation (5)
- Project Description and Impact on Existing Infrastructure (7)

Section 6.3 below provides a summary of the comments received during to the 30-day review of the Scoping Report, which have been grouped according to the following categories (the number in brackets indicates the number of issues raised):

- Heritage Impacts (1)
- General, EIA Process, Scoping Report and Public Participation (22)
- Project Description and Impact on Existing Infrastructure (9)
- Impact on Aquatic/Freshwater Resources (6)
- Impact on Terrestrial Ecology (Fauna and Flora) (8)
- Impact on Avifauna (2)
- Recommendations for the EMPr (1)

Section 6.4 below provides a summary of the comments received during to the 30-day review of the EIA Report, which have been grouped according to the following categories (the number in brackets indicates the number of issues raised):

- Heritage Impacts (1)
- General, EIA Process, and Public Participation (13)
- Project Description and Impact on Existing Infrastructure (2)
- Impact on Terrestrial Ecology and Aquatic/Freshwater Resources (including Potential Spillages and Stormwater Runoff) (10)

Suitable responses have been provided by the EIA Team and Applicant, as part of this finalised EIA Report that will be submitted 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.

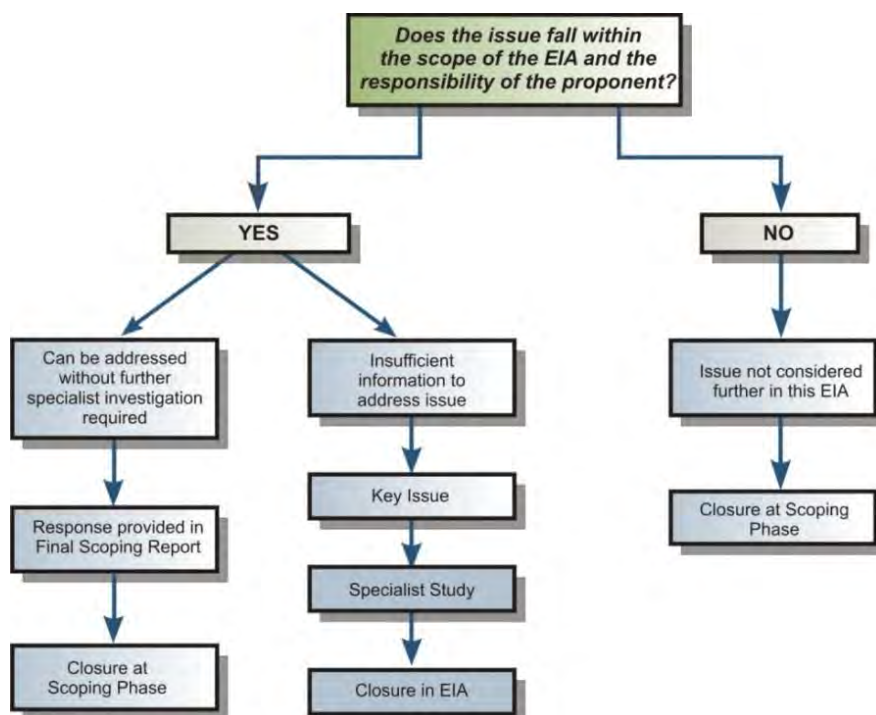


Figure 6.1: Decision-making framework for identifying key issues for the EIA

## 6.2 Issues and Responses Trail (Prior to the 30-day Review of the Scoping Report)

The tables below summarise the issues raised prior to the release of the Scoping Report for I&AP review, together with a response from the EIA team. Copies of the comments received are included in Appendix G of this EIA Report.

### 1. EIA Process and Public Participation

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
1.1	Kindly register me as an I&AP for the proposed development with CSIR Reference: EMS0102/SCATEC/2015.	Samantha De la Fontaine, District Ecologist, Northern Cape Department of Environment and Nature Conservation	29 July 2015, Email	<b>CSIR:</b> Comment noted. Samantha De la Fontaine 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.
1.2	Attached please find the completed comment and registration form.	Karen Low, Environmental Manager, Mulilo Renewable Project Developments	29 July 2015, Email and Comment and Registration Form	<b>CSIR:</b> Comment noted. Mulilo Renewable Project Developments was identified as an I&AP and thus pre-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.
1.3	Your company is currently conducting an Environmental Impact Assessment for the Proposed Development of Three Solar Photovoltaic Facilities and Associated Electrical Infrastructure North East of Kenhardt. Please could you forward me the BID for this application and register me as a Interested & Affected party?	Melanie Miles, Content Researcher, Leads 2 Business	3 August 2015, Email	<b>CSIR:</b> Comment noted. Melanie Miles 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 also provided to Melanie Miles via email.
1.4	Your notice received with regards to Basic Assessment; Scoping and Environmental Impact Assessment for the Proposed Development of the three Solar Photovoltaic Facilities and Associated Electrical Infrastructure; North-East of 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:	Melinda Mei, Senior Administration Clerk, Water Quality Management: Lower Orange Water Management Area, Department of Water and Sanitation	4 August 2015, Email	<b>CSIR:</b> Comment noted. The Department of Water and Sanitation was identified as a key stakeholder and thus pre-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 of the BID, including Letter 1 and a Comment and Registration Form, were sent to Mashudu Randwedzi

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>Department Of Water and Sanitation Louisvale Road Upington 8801</p> <p>OR</p> <p>Postal Address: Department Of Water and Sanitation Private Bag X 5912 Upington 8800</p>			and Melinda Mei of the Department of Water and Sanitation via registered post on 30 July 2015, at the following postal address: Private Bag X5912; Upington; 8800. The BID, Letter 1 and the Comment and Registration Form were also sent to these representatives of the Department of Water and Sanitation via email on 29 July 2015. Refer to Appendix E of this EIA Report for the registered mailing receipts and email delivery.
1.5	I want to register for the facility because I support the project.	John de Bruin, Henrohn Security	25 August 2015, Email	<b>CSIR:</b> Comment noted. John de Bruin 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 telephonic discussion was also held with John de Bruin on 21 August 2015.

## 2. Project Description and Impact on Existing Infrastructure

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
2.1	<p>The following immediate concerns are:</p> <ul style="list-style-type: none"> <li>▪ Possible glare from the solar panels which may influence the Train Drivers and staff travel on the TFR service road.</li> </ul> <p>Future concerns:</p> <ul style="list-style-type: none"> <li>▪ During construction, planned access routes to the facilities that might influence TFR (Dust on High Voltage Electrical Equipment).</li> <li>▪ The location of the High Voltage transmission lines.</li> <li>▪ Level crossing requirements (High risk of accidents).</li> <li>▪ During maintenance same issues as above.</li> </ul>	Gilbert Nortier, Depot Engineering Manager, Transnet Freight Rail	19 August 2015, Email	<p><b>CSIR and Scatec Solar:</b></p> <ul style="list-style-type: none"> <li>▪ Comment noted. The aspect of glare from the solar panels has been addressed in Chapter 2 of this EIA Report. It is important to note that the anticipated glare produced by the solar PV panels will not exceed the Standard Industry Norm generally accepted throughout South Africa. If a single axis tracker mounting system is employed, it will require PV arrays to be laid out in a North - South orientation, allowing the system to then track in an east - west orientation (as noted in Chapter 2 of this EIA Report). The single axis tracker mounting system will also minimize glare</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>drastically to the North and South of the proposed PV facility. Furthermore, as noted in Chapter 2 of this EIA Report, the glass used in the manufacture of PV panels is designed to maximize the absorption of light (to improve the energy efficiency of the panels) and minimize reflection and glare. PV panels are less reflective than water and it is therefore not anticipated to influence train drivers and users of the TFR Service Road. Scatec Solar also conducted research regarding the risk of glint and glare affecting train drivers and motorists on the railway and road near the Kenhardt projects, and established that overall this risk is understood to be very low due to the following:</p> <ul style="list-style-type: none"> <li>○ The very low reflectivity of solar PV glass (particularly with anti-reflective coatings) where it is observed to be lower than grass and water.</li> <li>○ The tracking of arrays and thus the incidence angle of the modules with the sunlight causing any reflected light to be reflected towards the sky and thus not towards the train and road.</li> <li>○ The Project Applicant also operates three other solar PV plants in South Africa, near railways (approximately 100 m away) and these have not had any reported effects on train drivers or motorists.</li> </ul> <p>▪ 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. Discussions have been initiated and held between Transnet Freight Rail and the Project Applicant to discuss the requirements for use of the Transnet Service Road. Dust may be generated during the construction phase, however it is expected to be of a short-term duration and insignificant. However,</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>mitigation measures relating to potential dust impacts have been included in the EMPr (Part B of the EIA Report), as applicable.</p> <ul style="list-style-type: none"> <li>▪ As noted in Chapters 1 and 2 of this EIA Report, the proposed transmission line will extend between the proposed Solar Facility and the Eskom Nieuwehoop Substation. Transmission lines will be constructed for each solar PV facility and have been assessed separately as part of the BA Process.</li> <li>▪ Recommendations and mitigation measures to reduce the risk of accidents as a result of the nearby ore railway line have been generally included in the EMPr (Part B of the EIA Report). Transnet will be provided with an opportunity to comment on the EIA Reports and EMPr during the EIA Phase which will be considered (as applicable) prior to submission to the Competent Authority, the DEA, for decision-making.</li> </ul>
2.2	<p>This letter is in response to your email request, to provide an assessment on the potential development of three solar PV electricity generation facilities in the Northern Cape Province and the risk they may pose on the Square Kilometre Array Project.</p> <p>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.</p> <ul style="list-style-type: none"> <li>▪ The location of the proposed facility has been provided in the background information document compiled by CSIR;</li> <li>▪ The nearest SKA station has been identified as SKA Station ID 2362, at approximately 20 km from the proposed installation;</li> <li>▪ Based on distance to the nearest SKA station, and</li> </ul>	Dr. Adrian Tiplady Head: Strategy, SKA South Africa	2 September 2015, Letter via email	<p><b>CSIR and Scatec Solar:</b></p> <ul style="list-style-type: none"> <li>▪ Comment noted. The distance of the proposed project to the nearest SKA station has been included in Chapter 4 of this EIA Report.</li> <li>▪ Comment noted. Scatec Solar has complied with the requirements from the SKA Project Office. A technical EMI and RFI study has been commissioned by Scatec Solar. As noted in Chapter 4 of this EIA Report, Scatec Solar appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of Proposed PV Projects in AGA Area, which is included in Appendix K of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office has reviewed the findings of this study during the 30-day review of the EIA Report, and has provided feedback during the EIA Phase, as noted in Section 6.4 below and included in Appendix G of this finalised EIA Report.</li> <li>▪ The SKA Project Office has been included on the project database as a key stakeholder, since the</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>the information currently available on the detailed design of the PV installations, these facilities poses a medium to high risk of detrimental impact on the SKA;</p> <ul style="list-style-type: none"> <li>▪ 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;</li> <li>▪ As a result of the medium to 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. 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.</li> </ul> <p>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.</p>			<p>commencement of the EIA Process. The SKA Project Office has been and will continue to be kept informed of project progress.</p>
2.3	<p>Thank you for your letter dated 29 July 2015, send to Mr van der Walt.</p> <p>Please note that this solar development will not impact on a national road, therefore SANRAL has no jurisdiction and have no further comment with regard to the Solar Facility.</p>	René de Kock, Statutory Control, SANRAL	4 September 2015, Email	<p><b>CSIR:</b> 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 if the aforementioned is required, application will be lodged with the SANRAL by the Applicant.</p>



NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	Should any service, e.g. power line and/or water pipe will be situated within 60m from the national road or will cross the national road application should be made to SANRAL for approval in terms of the National Roads Act.			

### 6.3 Issues and Responses Trail (During the 30-day Review of the Scoping Report and Addendum)

The tables below summarise the issues raised during the review of the Scoping Report by I&APs, together with a response from the EIA team. Copies of the comments received are included in Appendix G of this EIA Report.

#### 1. Heritage Impacts

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
1.1	<p>Letter</p> <p>In terms of Section of the National Heritage Resources Act (Act 25 of 1999)</p> <p>Attention: Scatec Solar SA 163 (PTY) Ltd</p> <p>Scatec Solar SA 163 (PTY) Ltd is proposing to develop three 75 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (132 kV transmission lines for each 75 MW facility) on the remaining extent of Onder Rugzeer Farm 168 and the connection points to the substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120. A separate full Scoping and EIA Process will be undertaken for each proposed 75 MW Solar PV facility. A separate BA Process will be undertaken for each transmission line. An integrated Public Participation Process will be undertaken for the proposed projects. Separate Applications for Environmental Authorisation will be submitted for each proposed 75 MW Solar PV facility and transmission line. Separate BA, Scoping and EIA Reports will be compiled for each project. This specific application will entail the construction of the proposed 75 MW facility and will be referred to as Kenhardt PV1. The proposed project will take place approximately 80 km south of Upington and 30 km north-east of Kenhardt within the Northern Cape Province.</p>	<p>Ragna Redelstorff, Heritage Officer SAHRA</p>	<p>22 September 2015, Letter via SAHRIS</p>	<p><b>CSIR:</b> This comment was received from the SAHRA in response to the review of the BID during the Project Initiation Phase, which was issued via the on-line SAHRIS on 22 September 2015. Unfortunately, an on-line notification email was not received from SAHRIS; hence this comment was only viewed by the EAP subsequent to the finalisation and printing of the Scoping Report for release to I&amp;APs for a 30-day comment period on 23 September 2015 (via email, registered mail and/or courier).</p> <p>Notwithstanding the above, the Scoping Report was also uploaded to the SAHRIS on 25 September 2015 for comment. No further comments have been received from the SAHRA and it is assumed that the comments dated 22 September 2015 (as included in Appendix G of this EIA Report) are still valid.</p> <p>As noted in Chapters 1 and 4 of this EIA Report, a Heritage Impact Assessment (Archaeology and Cultural Landscape) has been undertaken during the EIA Phase (i.e. prior to the commencement of construction of the Kenhardt PV 1 project (subject to the issuing of an EA)). This specialist assessment was conducted by Dr. Jayson Orton of ASHA Consulting (PTY) Ltd, who is a registered member of the Association of Southern African Professional Archaeologists. The re-formatted version of the Heritage Impact Assessment is included in Chapter 9 of this EIA Report, which was made available to registered I&amp;APs and the public for a 30-day comment period (3 March to 5 April 2016). The EIA Report, as well as a stand-alone Heritage Impact Assessment was uploaded to the SAHRIS during the 30-day comment period.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>The proposed project entails the construction of a solar photovoltaic (PV) facility and associated infrastructure on the remaining extent of the Farm Onder Rugzeer No 168 and connection points to the substation on the remaining extent of Portion 3 of the Farm Gemsbok Bult No 120, located approximately 30 km northeast of Kenhardt, Northern Cape Province. This project is part of a larger project comprising a total of three solar facilities (called Kenhardt PV1, 2 and 3).</p> <p>In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.</p> <p>The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists <a href="http://www.asapa.org.za">www.asapa.org.za</a>) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.</p> <p>The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase</p>			<p>The Heritage Impact Assessment (Archaeology and Cultural Landscape) has identified and assessed the significance of archaeological sites that are located within the proposed project area. The specialist assessment also indicates the relevant permit requirements, including if a permit is required from the Ngwao-Boswa Jwa Kapa Bokone (i.e. the Northern Cape Provincial Heritage Resources Authority) for the potential disturbance of any heritage features on site. The specialist study provides recommendations and suggests appropriate mitigation measures (if required), for the recording, sampling and dating of any archaeological sites that could potentially be destroyed as a result of the proposed project.</p> <p>As further noted in Chapters 1 and 4 of this EIA Report, based on the low palaeontological sensitivity of the area, a Palaeontological Heritage Desktop Assessment has been undertaken as part of the EIA Phase (i.e. prior to the commencement of construction of the Kenhardt PV 1 project (subject to the issuing of an EA)). This specialist assessment was conducted by Dr. John Almond of Natura Viva cc. The Desktop Palaeontological Impact Assessment assesses the significance of potential impacts of the proposed project on palaeontological resources. The Palaeontological Heritage Desktop Assessment includes recommendations for inclusion in the EMPr (Part B of the EIA Report). The desktop assessment is included in Chapter 10 of this EIA Report, which was made available to registered I&amp;APs and the public for a 30-day comment period (3 March 2016 to 5 April 2016), as well as uploaded to the SAHRIS.</p> <p>As noted in the Heritage Impact Assessment (Chapter 9 of this EIA Report), there are no buildings or structures within the proposed project footprint that need to be demolished for the establishment of the Kenhardt PV 1 project.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>(Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.</p> <p>The PalaeoSensitivity Map on SAHRIS (<a href="http://www.sahra.org.za/sahris/map/palaeo">http://www.sahra.org.za/sahris/map/palaeo</a>) indicates moderate palaeontological sensitivity for the proposed area. Therefore, the SAHRA Archaeology, Palaeontology and Meteorites Unit requires a desktop Palaeontological Impact Assessment to be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.</p> <p>Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.</p> <p>Should you have any further queries, please contact the designated official using the case number quoted above in the case header.</p>			

## 2. General, EIA Process, Scoping Report and Public Participation

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
2.1	<p>Your notice received with regards to Basic Assessment; Scoping and Environmental Impact Assessment for the Proposed Development of the three Solar Photovoltaic Facilities and Associated Electrical Infrastructure; North-East of Kenhardt; Northern Cape is of reference. DWS requires you to forward hard copies of the above mentioned project to either of the following address:</p> <p>Physical Address: Department Of Water and Sanitation Louisvale Road Upington 8801</p> <p>OR</p> <p>Postal Address: Department Of Water and Sanitation Private Bag X 5912 Upington 8800</p> <p>Your co-operation and assistance is highly appreciated.</p>	Melinda Mei, Senior Administration Clerk, Water Quality Management: Lower Orange Proto-CMA, Department of Water and Sanitation	29 September 2015, Email	<p><b>CSIR:</b> As noted in Section 6.2 above, the Department of Water and Sanitation was identified as a key stakeholder and thus pre-included on the project database of I&amp;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&amp;APs.</p> <p>Hard copies and CD copies of the Scoping Report for the Kenhardt PV 1, Kenhardt PV 2, and Kenhardt PV 3 projects, including Letter 2, a Comment and Registration Form and Executive Summaries, were sent to Ms. Melinda Mei of the Department of Water and Sanitation via courier on 30 September 2015, at the following physical address: Louisvale Road, Upington, 8801. Letter 2, the Executive Summaries of the Scoping Reports, and the Comment and Registration Form were also sent to representatives of the Department of Water and Sanitation via email on 23 September 2015. Refer to Appendix E of this EIA Report for the courier waybills and email delivery.</p> <p>Follow up responses were sent by the CSIR to Ms. Melinda Mei on 22 October 2015 and 30 October 2015 informing the Department of Water and Sanitation of the provision of hard copies and CD copies of the Scoping Reports. Refer to Appendix E of this EIA Report for a copy of this email response.</p>
2.2	<p>Regarding our telephonic conversation on the 06th October 2015, The Department of Environment and Nature Conservation is still waiting for the DEA Ref number of the following project Description:</p> <p>Scoping and Environmental Impact Assessment for the proposed Development of a 75MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province.</p>	Luzane Tools-Bernado, EIA: Administration, Northern Cape Department of Nature Conservation	12 October 2015, Email	<p><b>CSIR:</b> A response was sent to Ms. Luzane Tools-Bernado on 14 October 2015 via email confirming that, at that point in time, the DEA Reference Numbers had not yet been received. Refer to Appendix E of this EIA Report for a copy of this email response.</p> <p>The DEA Reference Numbers were only received from the DEA, together with an acknowledgement of receipt of the Applications for EA and Scoping Reports, on 26 October 2015 via email, as shown in Appendix 1.2 of this EIA Report. The following reference numbers have been assigned to the proposed projects:</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	Please do send the DEA Ref Number as we need to Acknowledge the document.			<ul style="list-style-type: none"> <li>▪ Kenhardt PV 1 - DEA EIA Reference: 14/12/16/3/3/2/837;</li> <li>▪ Kenhardt PV 2 - DEA EIA Reference: 14/12/16/3/3/2/838; and</li> <li>▪ Kenhardt PV 3 - DEA EIA Reference: 14/12/16/3/3/2/836.</li> </ul> <p>A further response was sent to Ms. Luzane Tools-Bernado on 27 October 2015 via email informing her of the receipt of the DEA Reference Numbers. Refer to Appendix E of this EIA Report for a copy of this email response. Ms. Luzane Tools-Bernado acknowledged receipt of the DEA Reference Numbers on 28 October 2015 via email (as shown in Appendix G of this EIA Report).</p>
2.3	<p>Can you please send me the registration form to register my company as an I&amp;AP under your database and I'm asking Mr Abed that in future I want to be informed and attend the meetings for the developments you bring to us.</p> <p>For enquiry please send me emails, or contact me: 072 056 2833 or 071 984 6106.</p>	Gloria Matlakala, !Kheis Municipality	26 October 2015, Email	<p><b>CSIR:</b> Ms. Gloria Matlakala has been included on the project database of I&amp;APs as requested. Refer to Appendix C of this EIA Report for a copy of the current database of I&amp;APs.</p> <p>In addition, a copy of the Comment and Registration Form was sent to Ms. Gloria Matlakala on 30 October 2015. Refer to Appendix E of this EIA Report for a copy of this email response.</p>
2.4	Thank you very much to update me on the above mentioned correspondence.	Gloria Matlakala, !Kheis Municipality	30 October 2015, Email	<b>CSIR:</b> Comment noted.
2.5	<p>The draft Scoping Report (SR) dated October 2015 and received by this Department on 02 October 2015, and the acknowledgement letter of the SR issued by this Department on 23 October 2015 refer.</p> <p>This Department has the following comments on the abovementioned application:</p> <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	2 November 2015, Letter (dated 29 October 2015) sent via email	<p><b>CSIR:</b> The relevant listed activities that are understood to be applicable and relevant to the proposed project were included in the original Application for EA that was submitted to the DEA via courier on 30 September 2015, together with the Scoping Report. The original Application for EA for the Kenhardt PV 1 project is included in Appendix H of the Scoping Report, with proof of submission (i.e. courier waybills) and DEA's acknowledgement of receipt included in Appendix E and Appendix I.2 of this EIA Report, respectively.</p> <p>Considering that the proposed project is in the conceptual design phase, some of the project specific information is not available at the EIA Phase. Therefore, as noted in Chapter 4, a precautionary approach was followed when identifying listed</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>activities (for inclusion in the original Application for EA and to be assessed as part of the Scoping and EIA Process), i.e. if the activity potentially forms part of the project, it is included as a listed activity in the Application for EA. However, the final project description will be shaped by the findings of the EIA Process, and certain activities may be added or removed.</p> <p>As mentioned in Chapter 4 of this EIA Report, it is understood that in terms of Listed Activity 9 of GN R983, the proposed project will entail the construction of stormwater channels or pipelines. Water pipelines will no longer be required for the transfer groundwater from existing boreholes to the proposed solar facility. During the Scoping Phase, the Project Applicant intended to make use of existing boreholes to source groundwater (if available and if suitable) for the solar panel cleaning process. It was further noted in the Scoping Report and original Application for EA that the Geohydrological Assessment (undertaken during the EIA Phase) will confirm whether the groundwater is sufficient and suitable for use. However, the Geohydrological Assessment (Chapter 11 of this EIA Report) recommends that the groundwater is not suitable for use during the construction and operational phases. Therefore, water pipelines will not need to be constructed in order to transfer groundwater from existing boreholes to the proposed solar facility. As a result, water will therefore be sourced from the municipality. Therefore Activity 9 (i) and (ii) of GN R983 is no longer applicable in terms of the construction of water pipelines.</p> <p>Furthermore, in terms of stormwater infrastructure, at this stage of the design it is understood that the stormwater infrastructure will cover an approximate length of 1000 m. However, the stormwater infrastructure will not have an internal diameter of more than 0.36 m, and it will not have a peak throughput of more than 120 l/s. Therefore Activity 9 (i) and (ii) of GN R983 is no longer applicable in terms of the construction of stormwater infrastructure.</p>

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				<p>The same applies to Activity 10 (i) and (ii) of GN R983 in terms of infrastructure for the transportation of sewage and effluent. At this stage of the design it is understood that the sewage infrastructure will cover an approximate length less than 1000 m, and it will not have an internal diameter of more than 0.36 m, or a peak throughput of more than 120 l/s. Therefore Activity 10 (i) and (ii) of GN R983 is no longer applicable in terms of the construction of stormwater infrastructure.</p> <p>In addition, Activity 24 (ii) of GN R983, which was included in the original Application for EA, is no longer applicable to the proposed project. This is due to the reasoning that the access roads and internal gravel roads that will be constructed on site will not exceed a width of 6 m.</p> <p>Therefore, Activity 9 (i) and (ii), Activity 10 (i) and (ii), and Activity 24 (ii) of GN R983 have been removed from the Application for EA. An amended Application for EA will be submitted to the DEA together with this <u>finalised EIA Report</u> for decision-making.</p> <p>On the other hand, Activity 56 (i) of GN R983 and Activity 18 (a) (ii) (ii) of GN R985, have become applicable to the proposed project (i.e. triggered by the proposed project, as a result of the design progression and the need to widen and upgrade the access road leading to the site). An amended Application for EA will be submitted to the DEA together with this <u>finalised EIA Report</u> for decision-making. This amended Application for EA is included in Appendix H of this EIA Report.</p> <p>The description of the applicability of the listed activities included in the Application for EA and noted in Chapter 4 of this EIA Report have provided as much detail possible at this stage of the design and EIA Process. The listed activities are linked to the proposed structures and infrastructure as described in Chapter 2 of this EIA Report.</p>



NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
2.6	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: <a href="http://www.environment.gov.za/documents/forms">http://www.environment.gov.za/documents/forms</a> .	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	2 November 2015, Letter (dated 29 October 2015) sent via email	<b>CSIR:</b> Comment noted. Refer to the response to Comment 2.5 above. An amended Application for EA will be submitted to the DEA together with the submission of this finalised EIA Report for decision-making, using the DEA's templates as recommended.
2.7	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 (including this Department's Biodiversity Section) in respect of the proposed activity are adequately addressed in the Final SR.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	2 November 2015, Letter (dated 29 October 2015) sent via email	<b>CSIR:</b> 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, Scoping Report and Addendum to the Scoping Report) were captured in the updated Issues and Responses Trail and addressed in this finalised Scoping Report, where required and as applicable. These 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.  Copies of the Scoping Report and Addendum were sent to the DEA Biodiversity and Conservation Directorate via courier. Proof of courier (i.e. waybills) is included in Appendix E of this EIA Report. To date, no comments have been received from the DEA Biodiversity and Conservation Directorate within the stipulated comment periods.
2.8	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 and 44 of the EIA Regulations 2014.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	2 November 2015, Letter (dated 29 October 2015) sent via email	<b>CSIR:</b> Comment noted. 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 Addendum are included in Appendix G of this EIA Report. Proof of follow up correspondence with key stakeholders and I&APs during the Scoping Phase (such the SKA, SANRAL, Department of Water and Sanitation, and Transnet Freight Rail) are included in Appendix E of this correspondence. It is important to note that all comments received from I&APs during the review of EIA Report will be included in the Comments and Responses Trail, as well as

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>the appendices of the finalised EIA Report, which will be submitted to the DEA for decision-making.</p> <p>As noted above, no comments have been received from the DEA Biodiversity and Conservation Directorate within the stipulated comment periods. In line with Regulation 3 (4) of the 2014 EIA Regulations, it is regarded that the DEA Biodiversity and Conservation Directorate has no comments on the Scoping Report and Addendum. The same applies for the EIA Phase, as to date, no comments were received from the DEA Biodiversity and Conservation Directorate.</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"> <li>- Regulation 39: As shown in Appendix H of this EIA Report, Van Niekerk Gesintrust is the only owner of the land on which the proposed project will take place (i.e. the remaining extent of Onder Rugzeer Farm 168). Proof of notice to the landowner and permission from the landowner has been obtained by the Project Applicant, which is included in Appendix 4 of the original and amended Application for EA.</li> <li>- Regulation 40: Throughout the Scoping Phase, all reports and documents compiled for public review (such as the BID, Scoping Reports and Addendum to the Scoping Reports) were made available to registered and pre-identified I&amp;APs, including the DEA, for a 30-day comment period. During the EIA Phase, the EIA Report was made available for public review for a period of 30-days (extending from 3 March 2016 to 5 April 2016). The PPP undertaken thus far has provided all project information available, which is understood to be important for the decision-making phase.</li> <li>- Regulation 41: As noted in Chapter 4 of this EIA Report, site notice boards were placed for the commencement of the</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>BA, 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&amp;APs to inform them of the proposed projects and invite potential I&amp;APs to register on the project database. Furthermore, in order to notify the public of the proposed project and invite I&amp;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. Also included in Appendix D of this finalised EIA Report is a copy of the newspaper advertisement that was placed in The Gemsbok on 2 March 2016 in order to notify the public of the release of the EIA Report for comment. During the Scoping Phase, letters were sent to registered and pre-identified I&amp;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). Email notifications were also sent to registered and pre-identified I&amp;APs for the release of the Addendums to the Scoping Reports. Copies of the written notifications sent during the Project Initiation and Scoping Phases are included in Appendix E of this EIA Report. During the combined BA and EIA Phase (i.e. this phase), letters have been sent to registered and pre-identified I&amp;APs, and as noted above, an advertisement has been placed in a local newspaper (i.e. The Gemsbok) as a notification of the release of the BA and EIA Reports for comment. As noted in the Plan of Study for the EIA (Chapter 8 of the Scoping Report) and Chapter 4 of this EIA Report, an advertisement will also be placed in a local newspaper to notify I&amp;APs of the outcome of the decision-making phase (should an EA be granted for the proposed project). It is not anticipated that the proposed project will have an impact beyond the boundary of the Local Municipality; therefore local newspapers will be 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</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>should the need arise as part of the PPP.</p> <ul style="list-style-type: none"> <li>- Regulation 42: As noted in Chapter 4 of this EIA Report, an initial database of I&amp;APs (including key stakeholders and organs of state) was developed. Appendix C of this EIA Report contains the current I&amp;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 EIA Report. At the time of compiling this finalised EIA Report for I&amp;AP review, the database stands at 83 I&amp;APs. I&amp;AP details were captured and automatically updated as and when information is distributed to or received from I&amp;APs.</li> <li>- Regulation 43: As noted above, registered I&amp;APs and relevant organs of state have been provided with a 30-day comment period on the BID, Scoping Reports and Addendum to the Scoping Reports. Registered I&amp;APs and relevant organs of state were also provided with a 30-day comment period on the BA and EIA Reports.</li> <li>- Regulation 44: The comments raised by I&amp;APs thus far during the Scoping Phase and EIA Phase have been recorded in this finalised EIA Report, with responses provided by the EAP and Project Applicant, which have been updated where required.</li> </ul>
2.9	Specialist studies must be submitted to the Department with the Final SR.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	2 November 2015, Letter (dated 29 October 2015) sent via email	<p><b>CSIR:</b> Specialist input was included in the Scoping Report, in terms of the description of the affected environment (Chapter 3 of the Scoping Report), and the identification of potential issues and impacts (Chapter 6 and Chapter 8 of the Scoping Report), applicable legislation (Chapter 4 of the Scoping Report), and preliminary mitigation measures (Chapter 6 and Chapter 8 of the Scoping Report). As such, the specialist scoping inputs were included in the relevant chapters of the Scoping Reports. 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. The DEA</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				accepted the Scoping Reports on 8 December 2015 (as shown in Appendix I.4 of this EIA Report).
2.10	Comments from the SKA must be included in the Final SR.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	2 November 2015, Letter (dated 29 October 2015) sent via email	<p><b>CSIR:</b> Comments from the SKA Project Office were received during the Project Initiation Phase (Section 6.2 of this chapter) and the Scoping Phase (Section 6.3 of this chapter). Copies of the comments raised by the SKA are included in Appendix G of this EIA Report.</p> <p>As noted above, as requested by the SKA, Solar has complied with the requirements from the SKA Project Office and a technical EMI and RFI study has been commissioned by Scatec Solar. As noted in Chapter 4 of this EIA Report, Scatec Solar appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of Proposed PV Projects in AGA Area, which is included in Appendix K of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office has reviewed the findings of this study during the 30-day review of the EIA Report, and have provided feedback during the EIA Phase, as noted in Section 6.4 below and included in Appendix G of this finalised EIA Report.</p>
2.11	Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed project activity or alternatives will have on the environment and on the community that may be affected by the activity as per Appendix 2 of GN R.982 of 2014. Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2.	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure Developments	2 November 2015, Letter (dated 29 October 2015) sent via email	<p><b>CSIR:</b> Chapter 5 of the finalised <u>Scoping Report</u> includes a detailed review and assessment of the alternatives that were considered in the Scoping Phase. The Scoping Report included the advantages and disadvantages of the alternatives that were considered during the Scoping Phase, as well as a high level assessment of potential impacts and risks identified for each of the location alternatives identified (Refer to the scoping Report for additional information).</p> <p>Chapters 5 and 16 of this EIA Report provide additional details regarding the preferred alternatives that have been considered in this EIA Phase.</p>
2.12	In accordance with Appendix 2 of the EIA Regulations 2014, the details of - (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out Scoping	Coenrad Agenbach, National DEA, Deputy Director: Strategic Infrastructure	2 November 2015, Letter (dated 29 October 2015) sent	<p><b>CSIR:</b> 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 Scoping Report. Appendix B also included the EAP's declaration of interest. Refer to the Scoping Report (CSIR, 2015) for a copy of the EAPs Declaration of</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	and Environmental Impact Assessment procedures; must be submitted.	Developments	via email	Interest and Curriculum Vitae.  Appendix A of this finalised 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.
2.13	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	2 November 2015, Letter (dated 29 October 2015) sent via email	<b>CSIR:</b> 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. The DEA accepted the Scoping Reports on 8 December 2015 (as shown in Appendix I.4 of this EIA Report).
2.14	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	2 November 2015, Letter (dated 29 October 2015) sent via email	<b>CSIR:</b> Comment noted.
2.15	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	2 November 2015, Letter (dated 29 October 2015) sent via email	<b>CSIR:</b> Comment noted.
2.16	Please find attached a copy of the comments by the Department of Water and Sanitation. The original will be sent to you via registered mail.  Please feel free to contact this department should you have any queries.	Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation	3 November 2015, Email	<b>CSIR:</b> Comment noted. Appendix G of this EIA Report includes a copy of the comments received from the Department of Water and Sanitation during the Scoping Phase.
2.17	The following proposed developments have reference:  Kenhardt PV 1: CSIR/CAS/EMS/ER/2015/0007/B Kenhardt PV 2: CSIR/CAS/EMS/ER/2015/0008/B Kenhardt PV 3: CSIR/CAS/EMS/ER/2015/0009/B	Elsabe Swart, Deputy Director - Research and Development Support, Northern Cape Department of Environment and Nature	5 November 2015, Email	<b>CSIR:</b> Ms. Elsabe Swart has been included on the project database of I&APs. Refer to Appendix C of this EIA Report for a copy of the current database of I&APs.  The complete correspondence received from the Northern Cape

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	Please refer to attached comments.	Conservation		Department of Environment and Nature Conservation is included in Appendix G of this EIA Report. This correspondence includes several figures and maps, as well as project background information (based on the information provided in the Scoping Report for review). Only the comments relating to the proposed project as included in the correspondence from the Department are extracted and included in this chapter.
2.18	Noted, thank you.	Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF	5 November 2015, Email	<b>CSIR:</b> This email was sent by Ms. Jacoline Mans of the DAFF, in response to the receipt of the comments issued by the Northern Cape Department of Environment and Nature Conservation. Ms. Elsabe Swart copied the comments from the Northern Cape Department of Environment and Nature Conservation to the DAFF.
2.19	<p>Point 3 - The proposed development do not form part of the Strategic Environmental Assessment (SEA) for Eskom's electricity grid upgrades and roll-outs as it falls outside one of the corridors identified by Eskom (i.e. the Western Corridor; one of the five identified corridors; refer to Figure 3). Comprehensive field surveys (within appropriate seasons) should thus be done for this specific area; it didn't form part of Eskom's assessment and the former project's surveys can thus not be used as baseline studies.</p> <p>Caption Figure 3 - Strategic Environmental Assessment (SEA) for ESKOM's electricity grid upgrades and roll-outs (Feb 2014) in relation to the proposed development (black arrow) near Kenhardt The proposed development falls outside one of the corridors identified by ESKOM (i.e. the Western Corridor; one of the five identified corridors), hence, it didn't form part of Eskom's assessment.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<p><b>CSIR:</b> Comment noted. Field surveys were undertaken by the relevant specialists during the Scoping and EIA Phases. The only specialist study that did not entail a field visit is the Desktop Palaeontological Impact Assessment (Chapter 10 of this EIA Report), which as explained in the Response to Comment 1.1 in Section 6.3 above; a desktop study is warranted based on the low palaeontological sensitivity of the area.</p> <p>The findings of the field surveys have been included in the relevant specialists studies (Chapters 7 to 15) as part of the EIA Reports (which are currently being released for a 30-day comment period during the EIA Phase). The relevance of the site visits are described in the relevant specialist studies.</p> <p>In addition, as mentioned in Chapter 4 of this EIA Report, the proposed project area did not form part of the preliminary corridors identified as part of the EGI SEA. However based on the final corridors, as shown in Figure 4.2 (Chapter 4) of this report, the proposed project does fall within one of the corridors identified as part of the EGI SEA. It is also important to note that the proposed project area also falls within a REDZ, as discussed in Chapters 1 and 5 of this EIA Report.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<i>Northern Cape Department of Environmental and Nature Conservation for context.</i>			
2.20	<p>Point 8 - Once the proponent decides on a project name, the latter should be made explicit. If the project name should change during the EIA phase of the project, this should be thoroughly communicated will all I&amp;APs. It has come to light that RE project names continuously change for various reasons and confusion is then caused by the interchangeable use of the various project names for a single project.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<b>CSIR:</b> Comment noted. If the project name changes during the EIA Process, I&APs will be informed of the change accordingly. However, the CSIR Reference Number provided for all six projects will be unchanged during the EIA and BA processes.
2.21	<p>Point 11 - Information regarding the probability of a site-visit to be conducted by officials from DEA / DAFF should be communicated with the DENC. This is to ensure cooperative governance, liaison and to enable a collaborative site-visit to be conducted.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<b>CSIR:</b> Comment noted. The Department of Environment and Nature Conservation will be contacted if any site visits are to be conducted by the DEA or DAFF during the EIA and BA Phases.
2.22	<p>Conclusion and recommendations: The proposed development is supported provided that the recommendations in this document are incorporated.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<b>CSIR:</b> Comment noted.



### 3. Project Description and Impact on Existing Infrastructure

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
3.1	Please send us three different drawings as this is 3 separate applications.	Marina Lourens, Transnet Freight Rail	25 September 2015, Email	<p><b>CSIR:</b> Separate maps showing the location of the proposed Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 projects, as well as the location of the nearby Transnet Freight Rail access road and railway line, were sent to Ms. Marina Lourens and copied to Mr. Gilbert Nortier of Transnet Freight Rail on 22 October 2015. Refer to Appendix E of this EIA Report for a copy of this email response.</p> <p>Discussions have been held between the Applicant and Transnet Freight Rail to discuss the proposed project and the potential use of the Transnet Service Road.</p>
3.2	<p>Please find attached Eskom requirements for renewable infrastructure development at or near Eskom infrastructure.</p> <p><i>Note from the CSIR: The complete documents of Eskom requirements are attached in Appendix G of this report.</i></p>	John Geeringh ( <i>Pr. Sci. Nat.</i> ), Senior Consultant Environmental Management, Eskom	29 September 2015, Email	<p><b>CSIR:</b> Comment noted. The following documents were received from Mr. John Geeringh via email on 29 September 2015:</p> <ul style="list-style-type: none"> <li>▪ Eskom requirements for work in or near Eskom servitudes; and</li> <li>▪ Renewable Energy Generation Plant Setbacks to Eskom Infrastructure.</li> </ul> <p>The abovementioned complete 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). Some of Eskom's general requirements in terms of work in or near Eskom servitudes are addressed in the EMPR (Part B of the EIA Report), such as waste management and ensuring that rubble or other material will not be dumped within the servitude. Discussions have been held between the Applicant and Eskom to discuss the proposed project and the connection point to the Eskom Nieuwehoop Substation.</p>
3.3	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	HJ Buys, Director: Land Use and Soil Management,	6 October 2015, Letter sent via	<p><b>CSIR:</b> Comment noted. The Department of Agriculture, Forestry and Fisheries on-line AgriLand application facility will be used in future, as required, and the assigned reference number will be</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>strongly recommended that you use the on-line AgriLand application facility in future. Detail of your application as captured:</p> <p>Application Type: Scoping Reports: Three Solar Photovoltaic Facilities</p> <p>Your reference number: Property Description: Onder Rugzeer 168 Dated: 25 September 2015</p> <p>Please use the following reference number in all enquiries:</p> <p>AgriLand reference number: 2015_10_0050</p> <p>Enquiries can be made to the above postal, fax or e-mail address.</p>	<p>Department of Agriculture, Forestry and Fisheries (National)</p>	<p>email</p>	<p>used in all future enquiries submitted to the Department in relation to the proposed project (as required).</p>
<p>3.4</p>	<p>I would herewith like to register as an IAP for the above listed project. May I also request a locality plan please. I would like to know if there is a transport plan available for this project yet.</p>	<p>Nicole Abrahams, Environmental Coordinator, SANRAL - Western Region</p>	<p>14 October 2015, Email</p>	<p><b>CSIR:</b> SANRAL was identified as a key stakeholder and thus pre-included on the project database of I&amp;APs and Organs of State at the outset of the Scoping and EIA Process. Ms. Nicole Abrahams has been included on the project database of I&amp;APs as requested. Refer to Appendix C of this EIA Report for a copy of the current database of I&amp;APs.</p> <p>In addition, separate maps showing the location of the proposed Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 projects were sent to Ms. Nicole Abrahams on 30 October 2015. Refer to Appendix E of this EIA Report for a copy of this email response.</p> <p>The anticipated traffic loads on the R27, R383, unnamed farm road and Transnet Service Road are expected to be significantly less than the design capacity of these roads. With this in mind, the traffic volumes contributed by the construction and operation phases of the facility on the existing traffic volumes</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				are considered acceptable. To this end, a Traffic Impact Statement has been prepared by the EAP and is included in Chapter 14 of this EIA Report. Recommendations for traffic impacts have been included in the EMPr. Ms. Nicole Abrahams was also informed of the Traffic Impact Statement. Refer to Appendix E of this EIA Report for a copy of this email response. To date, no further comments have been received from SANRAL.
3.5	<p>In summary, a detailed EMI and RFI survey would need to be undertaken to characterise the expected radio emissions from the facility. Once this has been conducted, radio frequency propagation modelling would need to be undertaken to determine the quantitative impact the proposed facility would have on the SKA.</p> <p>The relevant developer would need to contract EMI specialists to undertake these studies. I can suggest a group based in Pretoria, who have undertaken similar studies.</p>	Dr. Adrian Tiplady Head: Strategy, SKA South Africa	29 October 2015, Email	<p><b>CSIR:</b> This comment was received in response to a follow up correspondence sent by the CSIR on 23 October 2015 and 27 October 2015 regarding the EMI and RFI specialist surveys required by the SKA Project Office. Refer to Appendix E and Appendix G of this EIA Report for a copy of this email response.</p> <p>Linked to this, during the 30-day review of the Scoping Report, the CSIR contacted the SKA Project Office (via email) in order to confirm the scope, requirements and specifications of these EMI and RFI specialist studies. As noted in the response to Comment 2.2 in Section 6.2 above, Scatec Solar has complied with the requirements from the SKA Project Office. A technical EMI and RFI study has been commissioned by Scatec Solar. As noted in Chapter 4 of this EIA Report, Scatec Solar appointed MESA Solutions (PTY) Ltd to undertake the Cumulative Topographical Analysis of Proposed PV Projects in AGA Area, which is included in Appendix K of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office has reviewed the findings of this study during the 30-day review of the EIA Report, and have provided feedback during the EIA Phase as noted in Section 6.4 below and included in Appendix G of this finalised EIA Report.</p>
3.6	I will confirm tomorrow - however, I suspect our comments will be no different from what we have already submitted. Should we send no further comments, please treat our previous comments as still valid as we have not received any evidence of studies having been conducted. Unless I have missed something?	Dr. Adrian Tiplady Head: Strategy, SKA South Africa	29 October 2015, Email	<b>CSIR:</b> This comment was received in response to a further follow up correspondence sent by the CSIR on 29 October 2015 to query whether the SKA Project Office has any comments on the Scoping Report. Refer to Appendix E and Appendix G of this EIA Report for a copy of this email response.
3.7	I would like to confirm that our letter applies to all potential facilities of the same nature located at this	Dr. Adrian Tiplady Head: Strategy,	30 October 2015, Email	<b>CSIR:</b> Refer to the responses provided to Comment 2.2 in Section 6.2 above, as well as Comments 3.5 and 3.6 in Section 6.3

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	site, and future requests for comments on this and other facilities. Once we have been able to assess and analyse appropriate measurement reports, we will issue a further comment.	SKA South Africa		above.
3.8	Thank you for the locality plans. If any transport plan will be developed then you should forward that to me please.	Nicole Abrahams, Environmental Coordinator, SANRAL - Western Region	30 October 2015, Email	<b>CSIR:</b> Refer to the response provided to Comment 3.4 in Section 6.3 above.

#### 4. Impact on Aquatic/Freshwater Resources

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
4.1	<p>The Department of Water and Sanitation (DWS) hereby acknowledges receipt of your scoping and environmental impact assessment for the proposed development of three Solar Photovoltaic Facilities (Referred to as Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province. The department has reviewed the document and the comments are as follows:</p> <ul style="list-style-type: none"> <li>▪ 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.</li> <li>▪ 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. Please note that proof of the agreement between the applicant and the concerned Local Authority must be submitted to this Department.</li> </ul>	Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation	3 November 2015, Email	<p><b>CSIR:</b></p> <ul style="list-style-type: none"> <li>▪ As noted in the response to Comment 2.1 in Section 6.3 above, hard copies and CD copies of the Scoping Report for the Kenhardt PV 1, Kenhardt PV 2, and Kenhardt PV 3 projects, including Letter 2, a Comment and Registration Form and Executive Summaries, were sent to Ms. Melinda Mei of the Department of Water and Sanitation via courier on 30 September 2015.</li> <li>▪ Comment noted. 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, the Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna) included a survey of the area available for development (i.e. 450 ha). The specialist highlighted sensitive environmental features (such as watercourses, and protected vegetation species etc.) that occur within the surveyed area. Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which provides a detailed response to this comment relating to the construction of the proposed</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<ul style="list-style-type: none"> <li>▪ Any spillage of any hazardous materials including diesel that may occur during construction and operation must be dealt with and reported immediately to this Department.</li> <li>▪ 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.</li> <li>▪ Please note that no taking of water or storing of water from the water resource shall be lawful without a water use authorisation.</li> </ul> <p>Due to the high number of renewable energy projects that are taking part in the Department of Energy (DOE) bidding process, this Department (DWS) will only process applications for water use authorisations received from developers who have attained preferred bidder status.</p> <p>Developers who wish to submit applications for water use authorisations may however proceed to do so, with the understanding that their applications will be processed as soon as we have confirmation of their status with the DOE.</p> <p>Attached to this letter is Annexure 1 that details information, which must be submitted as part of the application for water use authorisation.</p>			<p>project in proximity to watercourses. <u>The Ecological Impact Assessment states that the 100 m set back 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. The specialist study further explains that a 100 m exclusion area around the drainage lines would incorporate extensive tracts of land which are in no way indicative of the concentrated surface hydrology.</u> 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 Ecological Impact Assessment has identified zones that should be subject to exclusion from any proposed development within the Kenhardt PV 1 area (Appendix 7.A of Chapter 7 of this EIA Report). These zones relate to the major drainage features that are associated with and proximal to the Wolfkopseloop drainage system. As mentioned above, a 32 m “buffer” or “setback” around the major drainage lines has been established, which is an indicative “norm” recommended by the various authorities. No additional sites of ecological significance that should be excluded from the development footprint have been identified in the Ecological Impact Assessment for the Kenhardt PV 1 area.</p> <p>Minor drainage lines were also identified within the Kenhardt PV 1 area, as noted in the Ecological Impact Assessment (Chapter 7 of this EIA Report). The “minor” drainage features are not considered to require exclusion from any land use change or the proposed development, due to the transformed surface hydraulics arising from the establishment of the Sishen-Saldanha railway line and its associated stormwater management infrastructure, as well as other anthropogenic interventions, such as borrow pits and roadways, which have further altered surface drainage, and the origins of the minor drainage features (as explained in the Ecological Impact Assessment in Chapter 7 of this EIA</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>Report, as well as the generally benign impact of solar arrays on surface flow. The Ecological Impact Assessment notes that although the minor drainage lines occurring within the site do not require avoidance, it would however be best for the design of the proposed solar PV facility to note the presence of these minor features and avoid establishing structures such as transformers, buildings and other permanent and significant structures within them. If necessary, it would be best to incorporate the minor drainage lines into the solar arrays.</p> <p>The sensitive features identified in all relevant specialist studies, including the Ecological Impact Assessment (Chapter 7 of this EIA Report), are summarised and spatially indicated in a sensitivity map shown in Chapter 16 of this EIA Report. Thereafter, together with the Applicant, a suitable location has been selected for the siting of the 250 ha facility, within the larger area surveyed by the specialists, and as far as possible, outside of the sensitive areas identified (as discussed in Chapter 16 of this EIA Report). The Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna) also includes recommendations for mitigating any potential negative impacts on nearby watercourses and surface hydrological features during the construction and operational phases.</p> <ul style="list-style-type: none"> <li>▪ 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 waste, where applicable, will be disposed at a licenced municipal landfill site. It was noted in the EIA</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>Report, which was released for a 30-day comment period, that confirmation from the municipality (in terms of landfill space and provision of services) will be sought during the EIA Phase. However, during the 30-day review of the EIA Report, several emails were submitted to the municipality to obtain and seek confirmation of services. Copies of these follow up emails are included in Appendix E of this EIA Report. To date, no responses have been received from the municipality in this regard. Telephonic calls were also made, however no responses were received.</p> <p>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.</p> <ul style="list-style-type: none"> <li>▪ It is important to re-iterate that it is proposed to store less than 30 m<sup>3</sup> 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 (Part B of the EIA Report). 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 of any significant spills that occur on site during the construction and operational phases.</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<ul style="list-style-type: none"> <li>▪ 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 EMP (Part B of the EIA Report).</li> <li>▪ As explained in Chapter 4 of this EIA Report, any activities that take place within a water course or within 500 m of a wetland boundary require a WUL under the Section 21 (c) and Section 21 (i) of the NWA. The Ecological Impact Assessment (Chapter 7 of this EIA Report) includes additional information regarding the need for a WUL. The Ecological Impact Assessment states that authorisation for changes in land use; up to 500 m from a defined water resource/wetland system will require an application for a WUL from the DWS. The Ecological Impact Assessment explains 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.</li> <li>▪ However, it is important to note that considerable efforts will be made to place the proposed solar field and project infrastructure outside of wetland areas and any sensitive surface hydrological features identified by the specialist. As noted above, a 32 m buffer has been recommended around the major drainage lines (i.e. the Wolfkopseloop) within the Kenhardt PV 1 area. No construction will occur within 32 m of the major drainage lines as recommended in the Ecological Impact Assessment. However, it is important to note that should the unnamed farm road be selected as the access road to site, it will need to be upgraded and widened. The existing farm road runs over the Rugseers River. Therefore potential widening of the existing access road will be undertaken within 32 m of water courses (which is permitted in terms of the EIA Regulations, should an EA be granted for the proposed project). Additional</li> </ul>



NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				<p>information regarding the road upgrade and widening is provided in Chapter 2 of this finalised EIA Report. As noted previously, the preferred site for the proposed Kenhardt PV 1 project includes approximately 450 ha of land, however the proposed solar facility and associated infrastructure requires a development area of approximately 250 ha only. The larger area has been proposed to allow for the avoidance of major environmental constraints in the siting of the location and layout of the 250 ha facility, which as far as possible, is sited outside of the sensitive areas identified by the specialists. Additional information regarding the siting of the proposed 250 ha facility is provided in Chapter 16 of this EIA Report.</p> <p>The DWS were consulted with during the EIA Process to seek further comment on the proposed project. It is understood that WUL Applications will only be processed by the DWS if preferred bidder status has been awarded to the Project Applicant. The requirements for WUL Applications have been provided to the Project Applicant for review and consideration.</p>
4.2	<p>Point 6 - It is advisable that RE facilities are not proposed for areas that favour local faunal diversity (e.g. endorheic pans, dry river washes, rocky outcrops, etc.).</p> <p>The Northern Cape is water scarce province, hence any form of sustained water, has the potential to stimulate vegetative growth and attract faunal species.</p> <p>Above-mentioned areas should be noted as sensitive areas during the EIA phase.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and</i></p>	<p>Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</p>	<p>5 November 2015, Letter sent via email</p>	<p><b>CSIR:</b> Comment noted. As far as possible, the proposed structures and infrastructure have been sited outside of the sensitive areas identified by the specialists as part of the EIA Phase. In particular, the Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna) included a survey of the area available for development (i.e. 450 ha). The specialist then highlighted any sensitive environmental features (such as watercourses, faunal and protected vegetation species etc.) that occur within the surveyed area. A suitable location was thereafter selected (together with the Project Applicant) for the siting and layout of the 250 ha facility, within the larger area surveyed by the specialists. The layout and siting of the facility is as far as possible, located outside of the sensitive areas identified, as discussed and shown in Chapter 16 of this finalised EIA Report. The Ecological Impact Assessment (Chapter 7 of this EIA Report) also includes recommendations for mitigating any potential negative impacts on nearby</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<i>Nature Conservation for context.</i>			watercourses and surface hydrological features during the construction and operational phases. Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a detailed response to this comment.

### 5. Impact on Terrestrial Ecology (Flora and Fauna)

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
5.1	<p>Point 1 - It should be noted that the areas where the proposed developments are to be constructed have been historically poorly surveyed, hence extrapolations from desktop studies for specialist's studies will give an incomplete representation of the biodiversity within the area (refer to Figure 2).</p> <p>Caption Figure 2- South African National Biodiversity Institute's (SANBI) PRECIS database (2013) indicating the number of plant specimens collected for specific Quarter Degree Grid Squares (QDGS). The proposed development falls within QDGS indicative of a very low species count (i.e. 1 - 50 species sampled per grid). Red squares denote zero specimens.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<p><b>CSIR:</b> Comment noted. The Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna), included in Chapter 7 of this EIA Report included a desktop component, as well as field work component. The desktop component of the study assisted the specialist to compile a baseline description of the terrestrial and aquatic ecology (including avifauna) of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity. The desktop review was undertaken using spatial data, SANBI conservation data, as well as other related information. The desktop survey also prepared the specialist for the fieldwork component by providing the necessary background information. The specialist then undertook field work and sampling across the site to record relevant data and to compile an overview of the habitat under review. The field assessment aimed to confirm the nature and structure of the habitat within the study area from an ecological perspective.</p> <p>Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a response to this comment. The Ecology Specialist notes that field reconnaissance was undertaken during assessment and that the PRECIS database is noted and confirmed.</p>
5.2	<p>Point 2 - Large <i>Aloe dichotoma</i> populations are known to occur in the region. The species is protected under the Northern Cape Nature Conservation Act (Act 9 of 2009) and at present there is a moratorium in place in the Northern Cape on the removal of <i>A. dichotoma</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la	5 November 2015, Letter sent via email	<p><b>CSIR:</b> As noted in Chapter 3 of this EIA Report, based on previous research, there are two quiver tree forests located towards the north of the proposed project site, on the Gemsbok Bult Farm (ASHA Consulting, 2015). This is also noted in the Ecological Impact Assessment (Chapter 7 of this EIA Report), which explains</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>from the wild due to historic trade related pressures on populations (Proclamation No 968, 1 April 2005). Hence, trees may not be removed until the moratorium is lifted. All trees within the development or close proximity thereof should be mapped and information provided with the EIA documents.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	<p>Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</p>		<p>that <i>Aloe dichotoma</i> was noted in adjacent lands but not associated with the Kenhardt PV 1 area. These species have been excluded from the development areas for Kenhardt PV 2 and PV 3. One single specimen of <i>Aloe dichotoma</i> was found within the <b>Kenhardt PV 2</b> site, which is discussed further in the EIA Report for <b>Kenhardt PV 2</b>. The presence of these protected trees on site is included in the relevant sensitivity mapping.</p>
5.3	<p>Point 5 - The development is proposed for an area that falls within the Bushmanland Arid Grassland, one of the most extensive vegetation types within the Northern Cape (Mucina and Rutherford, 2006). This vegetation types is poorly conserved in formal protected areas and extensive areas have been historically overgrazed. As a result, large areas are currently degraded and drainage lines have been modified as a result of anthropogenic impacts. As a result of the extent of the area, impact would most likely be on landscape connectivity as the site is in close proximity of drainage lines and wetlands (refer to Figure 5).</p> <p>Caption Figure 5 - Several landscape scale connections through drainage lines are evident within the area in question. The two proposed facilities i.e. the Three Solar PV (blue arrow) and Seven Solar PV (black arrow) are to be located in close proximity of drainage lines and wetlands.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	<p>Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</p>	<p>5 November 2015, Letter sent via email</p>	<p><b>CSIR:</b> Comment noted. The Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna) has assessed the impact of the proposed project on the vegetation and aquatic ecology within the study area, and is included in Chapter 7 of this EIA Report. The Ecological Impact Assessment notes that the landscape connectivity has been considered in the specialist study and preserved. In addition, the specialist study also explains that the drainage lines that are considered to be major watercourse features are excluded from development.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
5.4	<p>Point 7 - The disturbance of soil and indigenous vegetation can initiate the prolific growth of invasive alien plants (IAPs). The latter should be avoided by all means as it has detrimental impacts on indigenous faunal and floral species, as well as underground water resources. A proper IAP management plan must thus be factored into the EIA phase (as part of the EMP). Please consult the National Environment Management: Biodiversity Act's (Act No. 10 of 2004) Regulations on Alien and Invasive Species as promulgated on 1 August 2014.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<b>CSIR:</b> Comment noted. As noted in Chapter 4 of this EIA Report, alien plant species occurring within the study area will be managed in line with the EMPr (Part B of the EIA Report).
5.5	<p>Point 9 - It is advised that the consultants for this project liaise with the Forestry branch of the Department of Agriculture, Forestry and Fisheries (DAFF) if trees protected under the National Forest Act (Act No. 84 of 1998) are to be impacted by the proposed development.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<b>CSIR:</b> As noted in Chapter 4 and Chapter 7 (Ecological Impact Assessment) of this EIA Report, 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 <i>Acacia erioloba</i> and <i>Boscia</i> spp. <i>Boscia albitrunca</i> . The Ecological Impact Assessment (Chapter 7 of this EIA Report) established that none of the protected species in terms of the National Forest Act (Act 84 of 1998) were found on site during the survey. The Ecological Impact Assessment also notes that it is unlikely that an application for the “clearing of a natural forest”, as defined within the National Forest Act (Act 84 of 1998), will be required for the Kenhardt PV 1 site. The DAFF will be consulted with if any protected trees under the National

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				Forests Act (Act 84 of 1998) are found on site.
5.6	<p>Point 10 - If the proposed PV developments triggers biodiversity offsets under the DAFF due to the number of protected trees to be removed, this should be communicated with the DENC (contact Ms E. Swart at elsabe.dtec@gmail.com).</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<b>CSIR:</b> Comment noted. The Department of Environment and Nature Conservation will be contacted if any biodiversity offsets are required.
5.7	<p>Point A. Specialist's studies:</p> <ul style="list-style-type: none"> <li>▪ A thorough baseline survey of the grids 2921AB and 2921AD should be conducted during the EIA phase with at least the following biotic specialists: Ornithologist, Mammologist, Herpetologist (including amphibians) and Botanist. <ul style="list-style-type: none"> <li>○ Surveys for both the faunal and floral specialist reports should be done during the most optimum period for this area i.e. mid-summer to autumn, after the rains and during the growth season when maximum biota can be expected.</li> <li>○ This should be done in order to give a good representation of the ecology in the area.</li> <li>○ Due to the extreme variability in time and space of rainfall events, even a once-off survey within the rainy season will not provide a representative picture of the ecology of the area.</li> <li>○ The number of plants of conservation concern (e.g. <i>Aloe dichotoma</i>, <i>Aloe spp.</i>, <i>Trichocaulon spp.</i>, <i>Hoodia spp.</i>, <i>Boscia spp.</i> etc. under the Northern Cape Nature Conservation Act No. 9 of 2009 and National Environmental Management:</li> </ul> </li> </ul>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<p><b>CSIR:</b> As noted above, an Ecological Impact Assessment has been undertaken by qualified specialists as part of the EIA Phase. The Ecological Impact Assessment (Chapter 7 of this EIA Report) includes an assessment of Terrestrial Ecology, Aquatic Ecology and Avifauna. The specialist team includes a Registered Professional Natural Scientist (Ecologist), an Avian Specialist (ornithologist), a Freshwater Ecologist/aquatic specialist (Registered Professional Natural Scientist) and a GIS specialist. The specialist study will also make use of previous surveys undertaken for the adjacent Nieuwehoop Solar Development EIA project, which was recently undertaken by the CSIR.</p> <p>Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a response to this comment. The Ecological Impact Assessment notes that timeframes do not allow for a February to April period assessment. A drought period and meteorological state was noted at time of assessment.</p> <p>In addition, timeframes do not allow for continued long term assessments. Interpretation of landform, floral and faunal findings and multivariate analysis has been used to interpret and compile assessment. Given the findings of the Ecological Impact Assessment and the general severely grazed nature of the site, the information collated is considered sufficient to draw a conclusion on the nature of the ecology within the area.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>Biodiversity Act No. 10 of 2004, etc.) that may be directly affected by the development must be estimated during the EIA phase.</p> <ul style="list-style-type: none"> <li>○ Large <i>Aloe dichotoma</i> [NCNCA protected spp.] populations are known to occur in the region and any populations in close proximity to the planned facilities must be mapped.</li> </ul> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>			<p>Refer to the responses provided to Comments 5.1, 5.2, 5.3 and 5.5 in this section.</p>
5.8	<p>Point C - Ecology and landscape connectivity:</p> <ul style="list-style-type: none"> <li>▪ The proponent should include in the EIA an environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process and map combining the final layout plan overlain on the environmental sensitivity map. This map should be adequate in size to determine the extent of the development and to identify all aspects adequately as indicated on the maps. No-Go areas should be clearly identified.</li> <li>▪ The final layout of the proposed developments (all 3 phases) and its constituents should be designed in such a manner as to enhance ecological value to fauna and flora within the area and to avoid pressures associated with surrounding farmland i.e. natural areas for greening and designing to support ecological corridors and landscape connectivity are strongly encouraged.</li> <li>▪ The actual footprint for all activities related to the whole project (all Solar Park facilities) must be calculated to determine the total natural vegetation land cover transformation and loss.</li> </ul>	<p>Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</p>	<p>5 November 2015, Letter sent via email</p>	<p><b>CSIR:</b></p> <ul style="list-style-type: none"> <li>▪ As noted above, as far as possible, the proposed structures and infrastructure have been sited outside of the sensitive areas identified by the specialists as part of the EIA Phase. The relevant specialists have identified sensitive areas, such as no-go areas (based on the desktop research and fieldwork) and maps highlighting these sensitive features (including the layout map) are included in Chapter 16 of this EIA Report.</li> <li>▪ Recommendations for rehabilitation and re-vegetation are provided in the Ecological Impact Assessment (Chapter 7 of this EIA Report) and the EMPr (Part B of the EIA Report).</li> <li>▪ Comment noted. The actual footprint of all three Scoping and EIA Projects and three BA projects, together with potential residual impacts, are discussed in Chapter 16 of this EIA Report.</li> <li>▪ The Ecological Impact Assessment (Chapter 7 of this EIA Report) includes a Faunal Assessment, which provides recommendations for potential negative impacts on fauna. Recommendations on fencing and the use of electric fencing have been identified in the Ecological Impact Assessment (Chapter 7 of this EIA Report).</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>The collective and residual impact of all developments will be assessed also during permit applications. If the collective impact is assessed early enough the developer can better manage his risks and costs as he/she would know in advance whether a biodiversity offset is triggered also under DENC.</p> <ul style="list-style-type: none"> <li>▪ If electrification of the property as security measure is considered, possible electrocution damage to small mammals such as pangolin and tortoises should be taken into consideration.</li> <li>▪ Existing roads must be used as far as possible.</li> <li>▪ The EIA should indicate how the Social-Agricultural-Conservation dynamic will change in terms of land use. Will the properties on which the developments occur still be actively farmed or will they become dormant or effectively be converted into conservation land with minimal land use management. Will problem animal control still occur as in standard practice in small livestock farming? How will fencing infrastructure change around the properties which has a bearing on problem animal control, but also on wildlife movement and landscape connectivity.</li> <li>▪ The application must also be reviewed in the context of cumulative impacts of all RE developments in the region.</li> </ul> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>			<ul style="list-style-type: none"> <li>▪ As explained in the 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 will be constructed from either the Transnet Service Road or the unnamed farm road to the proposed project site. The internal gravel road is not expected to exceed 6 m in width (it is expected to be approximately 4 m wide). An approximately 2.5 m wide perimeter road will also be constructed within the fenced area of the plant.</li> <li>▪ At this point it is understood, based on feedback from the landowner, that farming operations will continue on the Onder Rugzeer Farm 168, in the areas surrounding the proposed Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 projects (should an EA be granted). The farmers will continue to implement problem animal control measures to ensure the sustainability of the farm. As explained in Chapter 2 of this EIA Report, fencing will be installed around the boundary of the proposed PV facility for security and legal purposes. As noted above, the impact of the proposed project on fauna (such as the construction of security fencing), has been assessed as part of the Ecological Impact Assessment (Chapter 7 of this EIA Report). Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a response to this comment.</li> <li>▪ As noted in Chapter 4 of this EIA Report, cumulative impacts have been assessed by identifying other solar energy projects and other applicable projects, such as construction and upgrade of electricity generation, transmission or distribution facilities in the local area (i.e. within 20 km of the proposed Kenhardt PV projects) that have been approved (i.e. positive EA has been issued) or the EIA is currently underway. The cumulative impacts are discussed in terms of each proposed Kenhardt PV project as well. Each specialist study (Chapters 7 - 15 of this EIA</li> </ul>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				Report), as well as Chapter 16 of this EIA Report includes a description of the cumulative impacts.

## 6. Impact on Avifauna

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
6.1	<p>Point 4 - The proposed area does not fall within or close to an Important Bird Area (IBA), yet it does resort within a region of grids classified as being sensitive to Wind Farm facilities (refer to Figure 4). The darker the pendent the more sensitive the specific area is to Wind Farm facilities. Closer scrutiny regarding bird studies is thus a prerequisite due to possible impacts of birds on grid infrastructure as by implication local or regional migratory species that move around in response to surface water availability may be at risk from infrastructure collisions. It is also critical to point out that bird data for this area is based on the South African Bird Atlas Project 1 (SABAP1); data published in 1997 and recorded at a much broader scale than the SABAP2 data survey. Evidently, one can conclude that data for this area is outdated. This is specifically highlighted as a point of concern as each of the three PV projects will be separately linked to the Eskom grid through its own set of powerlines.</p> <p>Caption Figure 4: The three Solar PV facility (blue arrow) is proposed for an area classified as being sensitive to Wind Farm facilities. The darker the pendent the more sensitive the specific area is to Wind Farm facilities. Though the proposed development is not a Wind Farm facility it poses significant risks to birds through collision with grid infrastructure as each of the three facilities will have its own transmission lines connecting to the Eskom</p>	Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation	5 November 2015, Letter sent via email	<p><b>CSIR:</b> As noted in Chapter 3 of this EIA Report, based on input provided by the Ecology Specialist, according to the SABAP2, an average of 182 bird species have been recorded in the greater study area. The study area does not fall within or in close proximity to any IBAs, with the closest being the Augrabies Falls National Park, located over 100 km to the north west of the study area (SDP, 2015). The impact of the proposed Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 solar facilities on avifauna has been assessed in the EIA Phase in the Ecological Impact Assessment (Chapter 7 of this EIA Report). As noted in Chapters 1 and 2 of this EIA Report, the impact of the proposed transmission lines on the surrounding environment have been assessed separately as part of a BA Process. The impact of the proposed transmission lines and associated electrical infrastructure projects (i.e. Kenhardt PV 1 - Transmission Line, Kenhardt PV 2 - Transmission Line and Kenhardt PV 3 - Transmission Line) on avifauna will be assessed in the BA reports, which is also being released for a 30-day comment period in conjunction with the EIA Reports. As noted above, the Ecological Impact Assessment included a desktop and fieldwork component, and it notes electric fencing, rather than overhead powerlines, is considered to be greatest risk to particular species of avifauna.</p> <p>Furthermore, as explained in Chapter 4 of this EIA Report, the proposed adjacent Mulilo Solar Development consisting of seven 75 MW PV Solar Energy Facilities, has been considered in terms of cumulative impacts during the EIA and BA phases.</p>



NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>Nieuwehoop grid station north east of the proposed development. A seven Solar PV facility (black arrow) is proposed north east of the proposed three Solar PV facility, each also having its own transmission line.</p> <p><i>Note from the CSIR: Refer to Appendix G of this EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>			
6.2	<p>Section B - Bird Monitoring:</p> <ul style="list-style-type: none"> <li>▪ Bird monitoring programmes should form part of the Environmental Management Programme. <ul style="list-style-type: none"> <li>○ Monitoring of birds over a full seasonal period (12 months) is supported.</li> <li>○ This will help to support a comparative lack of data on bird species in the study area from the SABAP database.</li> <li>○ The information will also provide data on bird flight paths, risk of collision in specific areas, habitat niches etc.</li> <li>○ An extensive monitoring area across the study area (i.e. non-resident species) is advised to comprehensively account for the movement of species.</li> </ul> </li> <li>▪ Appropriate bird deterrent devices must be placed around the facility to lessen the impact caused by collision of avifauna with the development infrastructure (Hernandez et al., 2014, Kagan et al., 2014). <ul style="list-style-type: none"> <li>○ All Power lines should be clearly marked with bird flappers / markers.</li> <li>○ Bird marker devices must be put on the earth wires (live wires) of the power line as appose to the conductors [Bird Flight Divertor (BFD) as appose to other bird marker devices are suggested (Anderson,</li> </ul> </li> </ul>	<p>Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</p>	<p>5 November 2015, Letter sent via email</p>	<p><b>CSIR:</b> Refer to the response provided to Comment 6.1 above. As noted above, an Avifaunal Assessment has been undertaken as part of the Ecological Impact Assessment (Chapter 7 of this EIA Report). The assessment aims to determine the impact of the proposed project on avifauna within the study area. Relevant guidelines were consulted during the assessment. The recommendations for the design of the transmission lines have been addressed as part of the separate BA Processes, which have been undertaken in line with the EIA Phase. Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a response to this comment.</p> <p>It is important to note that Birdlife South Africa and the SKA Project Office were included on the project database of I&amp;APs since the commencement of the EIA and BA processes (as shown in Appendix C of this EIA Report). As such, both organizations have been sent all notifications, to date, regarding the PPP associated with the proposed project. To date, comments have been received from the SKA Project Office (Appendix G of this EIA Report). No comments on the Scoping or EIA Reports were received from Birdlife South Africa to date. Only a single comment was received via post from Birdlife South Africa on 4 April 2016 to inform the CSIR of the change to the postal address. In addition, follow up emails (as included in Appendix E of this report) were sent to Birdlife South Africa to confirm and verify if they have any comments on the EIA Report. Nevertheless, they will be kept on the database for the remainder of the EIA and BA processes.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>2001)].</p> <ul style="list-style-type: none"> <li>▪ Relevant Birdlife SA protocols should be consulted to conduct the EIA assessment for birds (Guide to Access Avian Data for Environmental Impact Assessment Reports, Retief et al. 2013; BirdLife South Africa / Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa, Jenkins et al. 2012). Although the Jenkins and others guideline refers specifically to Wind farms, many of the principles apply for a thorough assessment. The electricity grid infrastructure especially remains a significant risk for bird collisions.</li> <li>▪ Potential impacts on water fowl such as flamingos, ducks and geese as well as large Terrestrial Birds such as bustards and korhaan as well as raptors must be investigated. Potential impacts must speak to the Renewable Energy technologies and infrastructure as well electricity grid infrastructure.</li> <li>▪ BirdLifeSA must be informed as I&amp;AP to provide comment on the development.</li> <li>▪ SKA must be consulted as I&amp;AP to provide comment on the development.</li> <li>▪ SAEON Arid Node must be informed as I&amp;AP to provide comment on the development.</li> </ul> <p><i>Note from the CSIR: Refer to Appendix G of the EIA Report for the complete correspondence sent by the Northern Cape Department of Environmental and Nature Conservation for context.</i></p>			<p>The SAEON Arid Node has been placed on the database for the EIA Phase (as shown in Appendix C of this EIA Report). SAEON were also provided with a letter informing them of the release of the EIA Report for comment, as shown in Appendix E of this finalised EIA Report. Further follow up emails (as included in Appendix E of this report) were also sent to SAEON to confirm and verify if they have any comments on the EIA Report. However, to date, no comments have been received from SAEON.</p>

## 7. Recommendations for the EMPr

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
7.1	<p>Section D: Environmental Management Programme:</p> <ul style="list-style-type: none"> <li>▪ Training and awareness on the illegal poaching and removal of succulents (e.g. <i>Hoodia gordonii</i>, <i>Euphorbia spp.</i>) and the protected quiver tree, <i>Aloe dichotoma</i>.</li> <li>▪ The EIA must address how risk of alien plant infestation by predominantly <i>Prosopis</i> will be addressed, since the region is known to be under threat from infestation.</li> <li>▪ A proper invasive alien management plan should be written into the EMPr. The area should be kept clear of invasive alien species; active management is a prerequisite.</li> <li>▪ Bird deterrent devices to lessen the impact caused by collision of avifauna with development infrastructure.</li> <li>▪ Possible electrocution of small mammals should be taken into account if electric fences are considered as a security measure.</li> <li>▪ Free movement of small mammals if the development property is to be fenced.</li> <li>▪ Rehabilitation plans must be provided as to how post construction rehabilitation will be approached as well as operational phase control measures for protecting equipment, for example cutting/scraping/ herbicide applications underneath solar panels.</li> </ul>	<p>Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</p>	<p>5 November 2015, Letter sent via email</p>	<p><b>CSIR:</b></p> <ul style="list-style-type: none"> <li>▪ The EMPr (Part B of the EIA Report) recommends that construction and operational staff are inducted and provided with Environmental Awareness Training in order to inform them of the presence, sensitivity of and importance of fauna.</li> <li>▪ The Ecological Impact Assessment (Chapter 7 of this EIA Report) addresses the impact of the spread of alien invasive vegetation as a result of construction and operational activities. Alien plant species will be managed in line with the EMPr ((Part B of the EIA Report)).</li> <li>▪ Refer to the responses provided to Comment 6.1 and Comment 6.2 above.</li> <li>▪ The Ecological Impact Assessment (Chapter 7 of this EIA Report) includes a Faunal Assessment, which provides recommendations for potential negative impacts on fauna. Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a response to this comment.</li> <li>▪ As noted above, the Ecological Impact Assessment (Chapter 7 of this EIA Report) includes a Faunal Assessment, which provides recommendations for potential negative impacts on fauna. Refer to the Ecological Impact Assessment (included in Chapter 7 of this EIA Report), which also provides a response to this comment.</li> <li>▪ Rehabilitation recommendations (as applicable) have been incorporated into the EMPr (Part B of the EIA Report).</li> </ul>

## 6.4 Issues and Responses Trail (During the 30-day Review of the EIA Report)

The tables below summarise the comments raised during the 30-day review of the EIA Report, together with a response from the EIA team. Copies of the comments received are included in Appendix G of this finalised EIA Report.

### 1. Heritage Impacts

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
1.1	<p>Letter</p> <p>Final Comment</p> <p>In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999)</p> <p>Attention: Scatec Solar SA 163 (PTY) Ltd</p> <p>Scatec Solar SA 163 (PTY) Ltd is proposing to develop three 75 Megawatt (MW) Solar Photovoltaic (PV) power generation facilities and associated electrical infrastructure (including 132 kV transmission lines for each 75 MW facility) on the remaining extent of Onder Rugzeer Farm 168 and the connection points to the substation on the remaining extent of Portion 3 of Gemsbok Bult Farm 120. A separate full Scoping and EIA Process is being undertaken for each proposed 75 MW Solar PV facility. A separate BA Process is being undertaken for each transmission line (and associated electrical infrastructure). An integrated Public Participation Process has been undertaken for the proposed projects. Separate Applications for Environmental Authorisation have been submitted for each proposed 75 MW Solar PV facility and transmission line (and associated electrical infrastructure). Separate BA, Scoping and EIA Reports have been compiled for each project. The proposed project will take place approximately 80 km south of Upington and 30 km north-east of Kenhardt within the Northern Cape Province. The proposed 75 MW Solar PV</p>	<p>Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA</p>	<p>5 April 2016, Letter via SAHRIS</p>	<p><b>CSIR:</b> This comment was received from the SAHRA in response to the review of the EIA Report, Heritage Impact Assessment and Palaeontological Impact Assessment during the EIA Phase. The comment was issued via the on-line SAHRIS on 5 April 2016.</p> <p>The re-formatted version of the Heritage Impact Assessment is included in Chapter 9 of this finalised EIA Report, whilst the Palaeontological Impact Assessment is included in Chapter 10 of this report.</p> <p>The response from SAHRA provides a summary of the key findings of the Heritage Impact Assessment and the Palaeontological Impact Assessment. Overall, the SAHRA accepts the Heritage and Palaeontological Impact Assessments and does not object to the proposed development. The SAHRA, however, have provided the following additional conditions that need to be included in the EMPr and adhered to by the Applicant during the construction and operational phases:</p> <ul style="list-style-type: none"> <li>▪ “A 30 m buffer must be maintained around the possible grave until it can be tested. Testing should take the form of Ground Penetrating Radar (GPR). A report detailing the testing must be submitted to SAHRA, following which the appropriate permits can be applied if necessary;</li> <li>▪ Waypoints 233, 234 and 760 must be avoided with either a 40 m or 75 m buffer as indicated in the AIA, or Phase 2 Archaeological Excavations must be conducted. A permit must be applied for in terms of section 35 of the National Heritage Resources Act, 1999 (NHRA); and</li> </ul>

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	<p>projects are referred to as: Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3 respectively. The Project Applicant is Scatec Solar SA 330 (PTY) Ltd for Kenhardt PV 1, Scatec Solar SA 350 (PTY) Ltd for Kenhardt PV 2 and Scatec Solar SA 370 (PTY) Ltd for Kenhardt PV 3. This specific application will entail the construction of the proposed 75 MW facility and will be referred to as Kenhardt PV 1.</p> <p>Scatec Solar SA 330 (Pty) Ltd appointed CSIR to undertake an Environmental Impact Assessment (EIA) process for the proposed 75 MW Solar Photovoltaic Facility (Kenhardt PV1), on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province. An Environmental Impact Assessment (EIA) was completed for the development in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the EIA Regulations 2014. The proposed project includes the construction of a 250 ha solar field array with associated infrastructure such as offices, operational and maintenance control centre, workshop, ablution facilities, convertor/inverter stations, on-site substation building and guard houses. Scatec Solar is in the process of applying for Environmental Authorisation for several projects in the area including three PV Solar Facilities and three Transmission Line Projects. This comment will only discuss information pertaining to the Kenhardt PV 1 Project. CSIR appointed Jayson Orton and John Almond to conduct the Archaeological Impact Assessment (AIA) and the Palaeontological Desktop Assessment for the project respectively.</p> <p><i>Orton, 2016. Scoping and Environmental Impact Assessment for the Proposed Development of a 75 Mw Solar Photovoltaic Facility (Kenhardt PV 1) on the Remaining Extent of Onder Rugzeer Farm 168, North-East of Kenhardt, Northern Cape Province.</i></p>			<ul style="list-style-type: none"> <li>▪ If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Itumeleng Masiteng/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required”.</li> </ul> <p>The Heritage Impact Assessment (Chapter 9 of this EIA Report) notes that the likely grave found within the Kenhardt PV 1 study area at waypoint 742 must be avoided with a buffer of at least 5 m or it must be test excavated to check for human remains and then a decision must be made to avoid or exhume in line with required process. Therefore, a 5 m buffer has been included in the sensitivity mapping shown in Chapter 16 and Appendix J of this finalised EIA Report. However, it is important to note that the likely grave found within the Kenhardt PV 1 study area at waypoint 742 falls <b>outside</b> of the actual development footprint and layout as shown in Chapter 16 and Appendix J of this finalised EIA Report. Nevertheless, the 30 m buffer as requested by SAHRA will be respected as the finalised layout and development footprint (as shown in Chapter 16 of this finalised EIA Report) avoids the likely grave at waypoint 742. Therefore this area will effectively be a no-go area.</p> <p>Furthermore, the Heritage Impact Assessment (Chapter 9 of this finalised EIA Report) notes that the features found at waypoints 233 and 234 should be avoided with a buffer of at least 40 m from the centre of the pan or archaeological excavations should be conducted to rescue artefacts and data. The Heritage Impact</p>

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	<p>A total of 23 heritage resources were identified within the proposed project area. The majority of these sites were described as surface scatters of Later Stone Age (LSA) lithics or flaked quartz outcrops with associated stone artefacts. These were given a rating of low significance with a low impact from the proposed development activities. Three sites were given a rating of medium significance i.e. Waypoint number 233, 760 and 234. These sites include LSA scatters of quartz, quartzite, crypto-crystalline silica and silcrete lithics around a pan or in clusters. One site was given a high significance rating as a possible grave.</p> <p>Recommendations provided in the report are as follows:</p> <ul style="list-style-type: none"> <li>▪ The three medium significance sites were recommended to be avoided with either a 40 m buffer (Waypoint 233 and 234) or 75 m buffer (Waypoint 760);</li> <li>▪ A buffer of 5 m was recommended for the possible grave. Alternatively, it should be tested to ascertain whether it is a grave or not;</li> <li>▪ The construction team should be made aware of the possibility of uncovering additional graves during construction and should report any suspicious stone features prior to disturbance;</li> <li>▪ The built elements of the facility should be painted in an earthy colour to minimise visual impact on the landscape; and</li> <li>• If any archaeological material or human burials are uncovered during the course of the development then work in the immediate area must be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.</li> </ul>			<p>Assessment also notes that the heritage features found at waypoint 760 should be avoided with a buffer of at least 75 m or archaeological excavations should be conducted to rescue artefacts and data. It is important to note, as shown in the Heritage Impact Assessment, that the features found at waypoints 233, 234 and 760 do not fall within the finalised development footprint and layout of the proposed PV facility or within the preferred Kenhardt PV 1 area. These features occur within the alternative site (Kenhardt PV 1b) which was considered during the Scoping Phase only and <b>will not be developed</b>. Nevertheless, the 40 m and 75 m buffer as requested by SAHRA will be respected as the finalised layout and development footprint (as shown in Chapter 16 of this finalised EIA Report) avoids the heritage features at waypoints 233, 234 and 760. Therefore these areas will effectively be no-go areas.</p> <p>Comment noted. If any evidence of archaeological sites or remains, fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit will be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit will be alerted immediately. As noted in the Heritage Impact Assessment and the Palaeontological Impact Assessment, a professional archaeologist or palaeontologist, depending on the nature of the finds, will be contracted to inspect any findings. These recommendations are included in the EMPr (Part B of the EIA Report).</p>

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	<p><i>Almond, 2015. Desktop Palaeontological Impact Assessment: Kenhardt PV 1 EIA</i></p> <p>The preferred area for the PV facility is underlain by igneous and metamorphic rocks that are entirely unfossiliferous. Small patches of calcrete, gravelly to sandy river alluvium, pan sediments; surface gravels as well as Pleistocene to recent windblown sands of the Gordonia Formation may contain sparse fossil remains such as important vertebrate fossils. The impact of the proposed development is rated as very low during the construction phase with no significant impacts expected during the operational and decommissioning phases. Recommendations provided in the report include that the Environmental Control Officer (ECO) must safeguard any fossil finds during the construction phase and report these finds to SAHRA. Where appropriate, sampling and recording of identified fossil material can be conducted by a qualified palaeontologist.</p> <p>Final Comment</p> <p>Regarding archaeological and palaeontological heritage resources, the SAHRA Archaeology, Palaeontology and Meteorites Unit accepts the submitted AIA and PIA and their respective recommendations, and has no objections against the development. The following additional conditions must be adhered to and must form part of the final EMP of the project should Environmental Authorisation be granted for the project:</p> <ul style="list-style-type: none"> <li>▪ A 30 m buffer must be maintained around the possible grave until it can be tested. Testing should take the form of Ground Penetrating Radar (GPR). A report detailing the testing must be submitted to SAHRA, following which the</li> </ul>			

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	<p>appropriate permits can be applied if necessary;</p> <ul style="list-style-type: none"> <li>▪ Waypoints 233, 234 and 760 must be avoided with either a 40 m or 75 m buffer as indicated in the AIA, or Phase 2 Archaeological Excavations must be conducted. A permit must be applied for in terms of section 35 of the National Heritage Resources Act, 1999 (NHRA); and</li> <li>▪ If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Itumeleng Masiteng/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required.</li> </ul> <p>Should you have any further queries, please contact the designated official using the case number quoted above in the case header.</p>			



## 2. General, EIA Process, and Public Participation

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2.1	Please could you advise if Environmental Authorisation has been received yet for the below developments?	Melanie Miles, Content Researcher, Leads 2 Business	22 February 2015, Email	<b>CSIR:</b> The overall EIA and Public Participation Processes are noted in Chapter 4 of this finalised EIA Report. This finalised EIA Report is being submitted to the DEA for decision-making in line with Regulation 24 (1) of the NEMA 2014 EIA Regulations. The DEA will have 107 days to either grant or refuse EA. It is expected that a decision on the EA will be granted by August 2016 (depending on the decision-making process and requests from DEA).
2.2.	Please check your weblinks - we are unable to download the EIA reports.	Karen Low, Environmental Manager, Mulilo Renewable Project Developments	7 March 2016, Email	<b>CSIR:</b> The project website was checked and all files were available for download.
2.3	<p>Thank you for notifying SAHRA of the update to the projects. Please note that SAHRA does not accept email, hardcopy or posted submissions. Please ensure that all relevant documents are uploaded to the correct case files on SAHRIS. I am assuming that the case files that refer to these projects are as follows:</p> <p>Kenhardt PV1: Case ID: 8204 (<a href="http://sahra.org.za/sahris/cases/scoping-and-eia-proposed-development-75-mw-solar-photovoltaic-facility-north-east-kenhardt">http://sahra.org.za/sahris/cases/scoping-and-eia-proposed-development-75-mw-solar-photovoltaic-facility-north-east-kenhardt</a>)</p> <p>Kenhardt PV 2: Case ID: 8205 (<a href="http://sahra.org.za/sahris/cases/scoping-and-eia-proposed-development-75-mw-solar-photovoltaic-facility-north-east-kenhardt-0">http://sahra.org.za/sahris/cases/scoping-and-eia-proposed-development-75-mw-solar-photovoltaic-facility-north-east-kenhardt-0</a>)</p> <p>Kenhardt PV 3: Case ID: 8206 (<a href="http://sahra.org.za/sahris/cases/scoping-and-eia-proposed-development-75-mw-solar-photovoltaic-facility-north-east-kenhardt-1">http://sahra.org.za/sahris/cases/scoping-and-eia-proposed-development-75-mw-solar-photovoltaic-facility-north-east-kenhardt-1</a>)</p>	Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA	8 March 2016, Email	<b>CSIR:</b> The Heritage Impact Assessment and Palaeontological Impact Assessments, together with supporting documents (such as the Conclusions and Recommendations chapter of the EIA Report, Public Participation Documents and mapping information) were uploaded to SAHRIS as requested by SAHRA. Only these files were uploaded due to the upload size restriction on line. SAHRA were informed of the upload and accordingly confirmed receipt of the documents. Refer to Appendix E and Appendix G of this finalised EIA Report for a copy of the email correspondence to and from SAHRA.

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	Please let me know if you have any further queries.			
2.4	Thank you for notifying SAHRA of the update. I will inform you when comments have been issued.	Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA	17 March 2016, Email	<b>CSIR:</b> Comment noted. Refer to the response to Comment 2.3 above.
2.5	I have started looking at the Kenhardt cases that were updated last week and I have noticed that three cases are missing their EIAs. Please ensure that the EIAs are uploaded to the case files so that I have all the relevant information in order to provide comments. Additionally, the appendices from the all the reports (EIAs and BARs) have not been uploaded to the case files. We need all the documents including all appendices to be submitted so that we can assess the case in its entirety. Appendices such as the maps, facility illustrations and public participation are particularly necessary. Please upload these documents to the case files so that we can process them without delay.	Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA	22 March 2016, Email	<b>CSIR:</b> Comment noted. Refer to the response to Comment 2.3 above. Based on the response from SAHRA, the complete EIA and BA Reports were split into various volumes for uploading onto SAHRIS to accommodate the size restriction. SAHRA were informed of the upload and accordingly confirmed receipt of the documents. Refer to Appendix E and Appendix G of this finalised EIA Report for a copy of the email correspondence to and from SAHRA.
2.6	I understand your dilemma, however we will accept the appendices and chapters in parts i.e. Part 1 of Appendix A, Part 2 etc, which would allow you to split the documents into manageable sizes for upload. While we would be able to download the documents from your website to review, they still need to be uploaded to the case file for record keeping purposes and we cannot do this on behalf of the applicant/consultant.	Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA	29 March 2016, Email	<b>CSIR:</b> Comment noted. Refer to the responses to Comment 2.3 and Comment 2.5 above.
2.7	Thank you for uploading the documents. The website has been down for most of today, but I shall try my best to get comments to you by 5 April 2016.	Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA	31 March 2016, Email	<b>CSIR:</b> Comment noted.
2.8	Mnr. J.H. de Bruin het gevra 6-50a tons hierdie vir u aanstuur.	John de Bruin, Henrohn Security (Sent via Cassie Carstens)	31 March 2016, Email and Comment	<b>CSIR:</b> Comment noted. John de Bruin was included on the project I&AP database since the Scoping Phase. Refer to Appendix C of this finalised EIA Report for a copy of the current

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	<p>Comment and Registration Form submitted:</p> <ul style="list-style-type: none"> <li>- Request to register as an I&amp;AP</li> <li>- Business Interest in the project (Security Services)</li> </ul>		and Registration Form	<p>database of I&amp;APs.</p> <p>In terms of job creation, the construction and operational phase employment opportunities will be created in line with the recommendations made in the Social Impact Assessment (Chapter 13 of this EIA Report), which includes developing and implementing a Workforce Recruitment Policy.</p>
2.9	My apologies our power was out and as a result the phone lines were also down.	Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation	1 April 2016, Email	<b>CSIR:</b> Comment noted. The Department of Water and Sanitation were contacted via email and telephone to follow up and confirm if the Department has any comments on the EIA and BA Reports. A copy of these follow up emails are included in Appendix E of this finalised EIA Report.
2.10	<p>Please note our change of address to Private Bag X5000, Parklands, Johannesburg, 2121. We receive post from your office for Simon Gear.</p> <p>Thank you for your kind attention.</p>	Janine Goosen, Office Administrator, BirdLife South Africa	4 April 2016, Letter (dated 8 March 2016) via Normal Post	<b>CSIR:</b> Comment noted. The details for BirdLife South Africa have been amended on the project I&AP database. Janine Goosen has also been included on the project I&AP database. Refer to Appendix C of this finalised EIA Report for a copy of the current database of I&APs.
2.11	Please note that comments have been issued on the above mentioned cases.	Natasha Higgitt, Heritage Officer: Archaeology, Palaeontology and Meteorites Unit, SAHRA	5 April 2016, Email	<b>CSIR:</b> Comment noted.
2.12	Find attached the Comments by the department on the Basic Assessment and Environmental Impact Assessment for Kenhardt PV 1,2,3	Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation	5 April 2016, Email	<b>CSIR:</b> Comment noted.
2.13	Your application is ready to be presented but the layout plan which is attached is not clear please email me layout plan which will show three projects with the sizes.	Khuthala D, DAFF	6 April 2016, Email	<b>CSIR:</b> Comment noted. A copy of the layout plan and sensitivity maps for the proposed projects was submitted to the DAFF via email as requested on 6 April 2016. Refer to Appendix E of this finalised EIA Report for a copy of this email correspondence.
2.14	Yes, it is standard comments.	Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation	7 April 2016, Email	<b>CSIR:</b> Comment noted. The DWS were contacted via email on 6 April 2016 to follow up and confirm if the comments submitted by the Department covers and address the three transmission line BA Reports, which were also sent to the Department together with the EIA Reports. The Department confirmed that

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				the comments apply to all EIA and BA projects. A copy of these follow up emails are included in Appendix E of this finalised EIA Report.
2.16	I received the C.D. - thank you very much. I missed the due date. If you can allow additional time, I can go through the reports and submit comments, otherwise it will be useless to comment if you have already submitted to DEA. Please advise. I receive too many EIA reports and I simply cannot comment on all due to time constraints and other responsibilities. But if you need inputs and can allow extra time, I will try to submit comments by Wednesday, 13 April. Please let me know so I do not waste time.	Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF	11 April 2016, Email	<b>CSIR:</b> This email was sent by Ms. Jacoline Mans of the DAFF, in response to follow up emails sent by the CSIR on 18 March 2016 and 4 April 2016 in order to seek comments from the DAFF on the EIA Report or to confirm that the DAFF do not have any comments. A further response email was sent to Ms. Jacoline Mans on 11 April 2016 informing her that the finalised EIA Reports are scheduled for submission to the DEA in the week of 11 April 2016 and that any comments would be appreciated as soon as possible. This was followed up by a telephonic discussion with the DAFF on 11 April 2016, where it was confirmed that the DAFF would try and submit comments by 12 April 2016 and if no comments are received by then, it must be understood that there are no comments. A copy of these follow up emails are included in Appendix E of this finalised EIA Report. Refer to the comments 2.17 and 2.18 below.
2.17	I only managed to go through one of the reports yesterday. I will try to look at the others today, but if I you do not hear from me by 16h00 this afternoon, please proceed with the printing and submission of your reports. Attached please find comments on the one project (Kenhardt PV 1 Transmission Line), CSIR Ref: EMS0102/SCATEC/2015).	Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF	12 April 2016, Email	<b>CSIR:</b> This email was sent by Ms. Jacoline Mans of the DAFF, in response to follow up emails sent by the CSIR on 11 April 2016 in order to seek comments from the DAFF on the EIA Report or to confirm that the DAFF do not have any comments. A copy of these follow up emails are included in Appendix E of this finalised EIA Report. DAFF submitted comments on the BA Report for Kenhardt PV 1 - Transmission Line. These comments have been included and responded to in the separate BA Report.
2.18	Dear Rohaida  Please find comments on the following 4 projects: 1) Kenhardt PV 3 Transmission Line 2) Kenhardt PV 1 Solar Photovoltaic Facility 3) Kenhardt PV 2 Solar Photovoltaic Facility 4) Kenhardt PV 3 Solar Photovoltaic Facility  I will not comment on the remaining project (Kenhardt PV 2 Transmission Line). The C.D. was not included in	Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF	12 April 2016, Email	<b>CSIR:</b> This email was sent by Ms. Jacoline Mans of the DAFF, in response to follow up emails sent by the CSIR on 11 April 2016 in order to seek comments from the DAFF on the EIA Report or to confirm that the DAFF do not have any comments. A copy of these follow up emails are included in Appendix E of this finalised EIA Report. DAFF submitted comments on the EIA Reports (noted below) and the BA Report for Kenhardt PV 3 - Transmission Line. These comments have been included and responded to in the separate BA Report.

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	the pack with the others. Thank you for allowing the additional time.			

### 3. Project Description and Impact on Existing Infrastructure

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3.1	<p>A high level risk assessment was conducted for the above mentioned photovoltaic electricity generation facilities, based on the distance to the nearest SKA station and information currently available on detailed designs of PV facilities. The results of the assessment show that the integrated risk posed by multiple PV facilities that are in close proximity could result in a medium to high detrimental impact on the SKA radio telescope.</p> <p>The South Africa SKA Project Office communicated these results to the CSIR in a letter dated 17th August 2015. The letter proposed that an Electromagnetic Interference (EMI) study be conducted in order to scientifically validate the impact these PV facilities could have on the SKA radio telescope, and also to assist with setting up the required mitigation measures that meet SKA radio emission requirements. CSIR, in consultation with the developer Scatec Solar, appointed MESA Solutions (Pty) Ltd to conduct the appropriate Electromagnetic Interference studies. The SKA SA Project office received the cumulative topographical analysis report produced by MESA Solutions (Pty) Ltd, which was based on radio propagation simulations. Upon detailed review of the report by the SKA SA Project office, the following was concluded:</p> <p>i. The results from the report compiled by MESA Solution (Pty) Ltd confirm that the</p>	Dr. Adrian Tiplady Head: Strategy, SKA South Africa	23 March 2016, Letter via email	<p><b>CSIR:</b> As noted above, Scatec Solar has complied with the requirements from the SKA Project Office. A technical EMI and RFI study has been commissioned by Scatec Solar. As noted in Chapter 4 of this EIA Report, Scatec Solar appointed MESA Solutions (PTY) Ltd (MESA Solutions) to undertake the Cumulative Topographical Analysis of Proposed PV Projects in the AGA Area, which is included in Appendix K of this EIA Report, with a summary provided in Chapter 15. The SKA Project Office has reviewed the findings of this study during the 30-day review of the EIA Report, and have provided feedback during the EIA Phase.</p> <p>A total of three Scatec Solar sites (Kenhardt PV 1 to PV 3), as well as ten Mulilo sites (Boven PV1 to PV4; Gembok PV1 to PV6) in close proximity (as indicated in Chapter 4 of this finalised EIA Report), were considered in this cumulative assessment. This technical report aims to inform the potential impact that the proposed project will have on the SKA project and to determine suitable mitigation measures to manage the risk (if any) posed to the SKA project by the development of this project. From the results it is found that:</p> <ul style="list-style-type: none"> <li>• Radiated emissions at levels below that of CISPR 11/22 Class B are required (especially in the case of the closest telescope).</li> <li>• Negligible terrain loss exists between majority of sites and closest SKA telescope.</li> <li>• Based on the measured plant emission RFI and maximum allowed emission levels, the required mitigation or surplus attenuation varies based on plant location and frequency. However, mitigation measures will have to be applied based on</li> </ul>

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	<p>development of these facilities would pose a high risk of detrimental impact on the SKA radio telescope if constructed without appropriate mitigation measure being put in place;</p> <p>ii. The report indicates that between 20 and 40 dB of attenuation is technically achievable to mitigate the risk posed by the proposed facilities. However, the lower limit of this range is below what would be required to comply with the SKA protection requirements;</p> <p>iii. Assuming all proposed mitigation measures are implemented and achieve the expected attenuation, Kenhardt PV1 and Kenhardt PV3 would pose a low to medium risk of detrimental impact. Kenhardt PV2 would remain a high risk;</p> <p>iv. An appropriate EMC control plan should be developed to identify specific mitigation measures that will be implemented for Kenhardt PV1, 2 and 3. In particular, the measures implemented for Kenhardt PV2 should be tested and proven within a laboratory environment prior to construction approval;</p> <p>It should be noted that, as this proposed facility is located in the declared Karoo Central Astronomy Advantage Area, the use of any wireless communication (ie. Bluetooth, Wifi, proprietary wireless communication) would be subject to compliance with the relevant AGA regulations promulgated for this area.</p> <p>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</p>			<p>the highest required level. The required 50 dB of shielding at Boven PV1 at 942 MHz, for example, would require significant attention to detail to achieve.</p> <p>It is MESA Solutions expectations that, if the mitigation measures that are specified are implemented correctly, attenuation of between 20 dB and 40 dB can be achieved. The study strongly recommended that the following mitigation practises be incorporated into the plants design:</p> <ul style="list-style-type: none"> <li>• The inverter units, transformers, communication and control units for an array of panels all be housed in a single shielded environment.</li> <li>• For shielding of such an environment ensure RFI gasketting be placed on all seams and doors and RFI Honeycomb filtering be placed on all ventilation openings.</li> <li>• Cables to be laid directly in soil or properly grounded cable trays (not plastic sleeves).</li> <li>• The use of bare copper directly in soil for earthing is recommended.</li> <li>• Assuming a tracking PV plant design, care will have to be taken to shield the noise associated with the relays, contactors and hydraulic pumps of the tracking units.</li> <li>• All data communications to and from the plant to be via fibre optic.</li> </ul> <p>The above mitigation measures will be considered and incorporated into the design by the Project Developer in order to ensure that the risks are lowered. As requested by the SKA, the Project Developer will develop an appropriate Electro Magnetic Control (EMC) Plan to identify specific mitigation measures that will be implemented for Kenhardt PV1, 2 and 3.</p> <p>In addition, based on the recommendation from the SKA, the Project Developer will appoint a suitable specialist to test and prove the measures implemented for <b>Kenhardt PV2</b> (for which a</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>constitute legal approval of the renewable energy projects in terms of the Astronomy Geographic Advantage Act, the Management Authority, and its regulations or declarations.</p>			<p>separate EIA Process has been conducted and EIA Report compiled) in a laboratory environment prior to the commencement of construction. It is understood that this can occur subsequent to the issuing of an EA (should such an EA be granted by DEA). This recommendation will therefore be put forward to DEA as a recommendation for inclusion as a condition in the EA, together with the understanding that the SKA are satisfied that the risk is mitigated completely before any construction takes place.</p> <p>Scatec Solar have allocated project budget and have committed to adhere to the provisions stipulated within the correspondence from the SKA dated 23 March 2016. The EMC Plan will be provided to the SKA for comment and authorisation during the pre-construction design phase. Refer to Appendix E of this finalised EIA Report for a letter from the Project Applicant to the DEA stating its commitment to the implementation of the mitigation measures and recommendations of the SKA Project Office.</p> <p>In order to ensure further commitment from the Project Developer, it is recommended that the abovementioned recommendations from the SKA Project Office (i.e. to compile an EMC Plan and obtain approval from the SKA on the plan prior to construction) be included as conditions to the EA (should such an authorisation be granted). Refer to Chapter 16 of this finalised EIA Report for additional information.</p>
3.2.	<p>1. Any medium or high risk means that, unless specific and detail mitigation measures are design and implemented, it would be a fatal flaw. Specifically, a high risk means that we think the amount of mitigation require will be technically very challenging, and that there is no guarantee is could be achievable. Medium risk means that the amount of mitigation is still technically challenging, but could be achievable. However, we would need to see evidence that such a process has taken place;</p> <p>2. We would be comfortable that its a condition of the</p>	<p>Dr. Adrian Tiplady Head: Strategy, SKA South Africa</p>	<p>7 April 2016, Letter via email</p>	<p><b>CSIR:</b> This email was received in response to three follow up queries sent to the SKA by the CSIR. Refer to Appendix E of this EIA Report for a copy of these follow-up emails. Refer to the response provided to Comment 3.2 above for additional information in this regard.</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>EA, but the condition must ensure that we are satisfied that the risk is mitigated completely before any construction takes place;</p> <p>3. I can suggest MESA Solutions in Stellenbosch or ITC Services in Pretoria. What is important is that it is more than just tests required - but detailed design work as well.</p>			

#### 4. Impact on Terrestrial Ecology and Aquatic/Freshwater Resources (including Potential Spillages and Stormwater Runoff)

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
4.1	<p>Basic Assessment and Environmental Impact Assessment Report for the proposed development of three Solar Photovoltaic Facilities (referred to as Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3) and associated infrastructure on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province.</p> <p>The Department of Water and Sanitation (DWS) hereby acknowledges receipt of your basic assessment and environmental impact assessment for the proposed development of three Solar Photovoltaic Facilities (Referred to as Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3) and associated infrastructure on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province. The department has reviewed the document and the comments are as follows:</p> <ul style="list-style-type: none"> <li>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.</li> </ul>	Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation	5 April 2016, Letter via email	<b>CSIR:</b> Comment noted. These comments were submitted by the DWS in response to the review of the Kenhardt PV EIA and BA Reports. These comments are the same as those comments that were submitted by the DWS in November 2015 based on the review of the Scoping Reports. These comments have been addressed as part of the Scoping Phase. Kindly refer to the response provided to Comment 4.1 in Section 6.3 above.



NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<ul style="list-style-type: none"> <li>▪ 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. Please note that proof of the agreement between the applicant and the concerned Local Authority must be submitted to this Department.</li> <li>▪ Any spillage of any hazardous materials including diesel that may occur during construction and operation must be dealt with and reported immediately to this Department.</li> <li>▪ 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.</li> <li>▪ Please note that no taking of water or storing of water from the water resource shall be lawful without a water use authorisation.</li> </ul> <p>Due to the high number of renewable energy projects that are taking part in the Department of Energy (DOE) bidding process, this Department (DWS) will only process applications for water use authorisations received from developers who have attained preferred bidder status.</p>			
4.2	<p>1. Departmental Mandate</p> <p>The Directorate: Forestry Management (Other Regions) in the National Department of Agriculture, Forestry and Fisheries (DAFF) is responsible for implementation of the National Forests Act, Act 84 of 1998 (NFA) and the National Veld and Forest Act, Act 101 of 1998 as amended. The developer must take note of the</p>	<p>Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern</p>	<p>12 April 2016, Email</p>	<p><b>CSIR:</b> Comment noted. The National Forests Act (Act 84 of 1998) is described in Section 4.3.1.5 of Chapter 4 of this finalised EIA Report, as well as in the Ecological Impact Assessment (Chapter 7 of this finalised EIA Report). The Project Developer is aware of the requirements of the National Forests Act (Act 84 of 1998).</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>following sections of the NFA:</p> <p>1.1. Section 12(1): “The Minister may declare-</p> <ul style="list-style-type: none"> <li>(a) A particular tree,</li> <li>(b) A particular group of trees,</li> <li>(c) A particular woodland; or</li> <li>(d) Trees belonging to a particular species, to be a protected tree, group of trees, woodland or species”. <p>1.2. Section 15(1): “No person may-</p> <ul style="list-style-type: none"> <li>(a) Cut, disturb, damage or destroy any protected tree; or</li> <li>(b) Possess, collect, remove transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except- <ul style="list-style-type: none"> <li>(i) Under a licence granted by the Minister; or</li> <li>(ii) In terms of an exemption from the provision of this subsection published by the Minister in the Gazette on the advice of the Council.”</li> </ul> </li> </ul> <p>1.3. Section 62(2)(c): “Any person who contravenes the prohibition on-</p> <ul style="list-style-type: none"> <li>(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</li> <li>(ii) The possession, collection, removal, transport, export, purchase or sale of temporarily protected trees or groups of trees referred to in Section 14(2) or protected trees referred to in Section 15(1)(b), or any forest product derived from a temporarily protected tree, group</li> </ul> </li></ul>	Cape, DAFF		

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
	<p>of trees or protected tree, is guilty of a first category offence.</p> <p>1.4. Section 58 (1): Any person who is guilty of a first category offence referred to in Sections 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> <p>1.5. The list of protected tree species under section 12 (1) (d) of the National Forests Act, 1998 (Act No. 84 of 1998) was published in GN1161 of 20 November 2015.</p>			
4.3	<p>Point 2.1: The report stated that the proposed 75 MW Photovoltaic Facility will cover an area of +/- 250 hectares (ha), although an area of 450 ha was assessed.</p> <p>Figure 3.2 refers to the sensitivity map for the proposed Kenhardt PV 1 project, but it does not give a clear indication of which areas within the PV 1 project area are deemed sensitive, if any. The whole area is in one colour and no indication was given as to whether it has a low, moderate or high environmental sensitivity. The only environmental sensitivities referred to are rivers and NFEPA Wetlands (artificial and natural). Figure 7.1 shows a major drainage line intruding into the proposed project area. Figure 16.2 gives a much better indication of sensitivity on site and should be used to determine the final layout.</p>	<p>Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF</p>	<p>12 April 2016, Email</p>	<p><b>CSIR:</b> Comment noted.</p> <p>The map shown in Figure 3.2 in Chapter 3 of this finalised EIA Report is a generalized sensitivity map showing the overall sensitive features of the affected environment. The purpose of Chapter 3 is to provide a broad overview of the general area and affected environment; however it does not represent a detailed environmental study. Detailed descriptions of the preferred project site (Kenhardt PV 1) focused on significant environmental aspects of this project are provided in the relevant specialist studies. The Ecological Impact Assessment in Chapter 7 of this finalised EIA Report provides a more detailed description of the hydrological features present on site.</p> <p>The sensitivity map provided in Chapter 16 of this EIA Report, on the other hand, includes all the sensitive environments identified by the specialists on site, which include a single likely grave, and minor and major drainage lines.</p> <p><b>Ecology Specialist:</b></p> <p>There is little or no environmental sensitivity associated with Kenhardt PV 1 from a <u>terrestrial perspective</u>, as the site is generally uniform in nature. Figure 7.1 of the Ecological Impact Assessment, Chapter 7 of this finalised EIA Report, indicates the</p>

NO	ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
				nature of the site under consideration as per the explanation below. The appendices to the Ecological Impact Assessment (Appendix 7.A) report indicate those areas deemed “sensitive” and have been intercalated into the layout shown in Chapter 16 of this finalised EIA Report, as well as Appendix J.
4.4	Point 2.2: The Ecological Impact Assessment stated on Page 7-13 that “according to Mucina and Rutherford’s veld type classification of 2006, Kenhardt and surrounding regions fall within the Bushmanland Arid Grassland veld type (NKb3).” Please note that south of Kenhardt there is patches of intermingling units of Lower Gariep Broken Veld with its characteristic <i>Aloe Dichotoma</i> trees. The vegetation map provides a broad classification of vegetation types found in South Africa, but on a local level there may be great variation with specialised vegetation units. There are also transitional zones. The Twinspan results (Figure 7.5) should ideally be mapped to show the locations of the three prevailing different vegetation associations.	Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF	12 April 2016, Email	<b>Ecology Specialist:</b>  The mapping of the site is superfluous. Figure 7.6 indicates that the identified vegetation associations are disseminated across site being driven by varying geologies and soil depth, but primarily grazing by livestock. Should the TWINSPAN have revealed a trending across site or a similar result, then perhaps further examination of data and the compilation of a map to identify significant variation would have been of value.
4.5	Point 2.3: Page 4-20, number 4.3.1.5 stated that no NFA listed protected species were found on site during the survey. The DENC, Ms. E. Swart, refers to populations of <i>Aloe Dichotoma</i> known to occur in the region and the response to her comment was that “ <i>Aloe Dichotoma</i> was noted in adjacent lands but not associated with the Kenhardt PV 1 area.” The affected Bushmanland Arid Grassland vegetation type may contain the provincially protected <i>Boscia foetida</i> subsp. <i>foetida</i> . Other plant species known to occur in the vicinity of Kenhardt include <i>Parkinsonia Africana</i> and the protected Cancer bush <i>Sutherlandia frutescens</i> , none of which was encountered on site according to Table 7.1.  The DAFF is kindly requesting to do a pre-construction site inspection (preferably with the DENC) to confirm these findings.	Jacoline Mans, Designation: Chief Forester (NFA Regulation), Directorate: Forestry Management (Other Regions) Northern Cape, DAFF	12 April 2016, Email	<b>Ecology Specialist:</b>  The potential for these species to be present on site was noted. A pre-construction review of site, undertaken preferably in late summer is supported.  <b>CSIR:</b>  A pre-construction site inspection could possibly be arranged subsequent to the issuing of an EA, to allow survey of the final footprint.

# EIA REPORT



## CHAPTER 7:

# Ecological Impact Assessment

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

*Report prepared for:*

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*Report prepared by:*

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April 2016

## 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- 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;	Appendix A of the EIA Report
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 7.1.6 of this chapter and Appendix B of the 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 7.1.4.
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;	Section 7.3, Section 7.5 and Section 7.6
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1
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 7.6
k) any mitigation measures for inclusion in the EMPr;	Sections 7.6 and 7.8
l) any conditions for inclusion in the environmental authorisation;	Sections 7.6, 7.8 and 7.9
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7.8
n) a reasoned opinion- 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;	Section 7.9
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 7.6
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 7.5
q) any other information requested by the competent authority.	n/a

# list of abbreviations

DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
ELP	Electrical light pollution
NEMA	National Environmental Management Act
NEMBA	NEM Biodiversity Act
TWINSpan	Two Way Species Indicator Analysis



# glossary

<b>Definitions</b>	
<b>Arid</b>	Areas which receive low levels of rainfall or there is a moisture deficit.
<b>Crepuscular</b>	Fauna that is active at twilight
<b>Dendrogram</b>	A diagram showing relationships determined through a cluster analysis
<b>Calcrete</b>	A carbonate horizon formed in semi-arid regions. Also known as a caliche.
<b>Dolerite</b>	Form of igneous rock.
<b>Drainage line</b>	A geomorphological feature in which water may flow during periods of rainfall.
<b>Edaphic</b>	Pertaining to soils.
<b>Fossorial</b>	Pertaining to burrowing animals or those which live underground
<b>Geophyte</b>	Plants with underground storage organs.
<b>Graminoid</b>	Grasses or grass-like. Also monocotyledonous plants.
<b>Gully</b>	An erosion line exceeding 30cm in depth where water flow is concentrated and erosion resulting from flow is clearly evident.
<b>Hydrogeomorphological</b>	The interaction of geomorphic processes, landforms and /or weathered materials with surface and sub-surface waters.
<b>Hygrophilous</b>	Plants growing in damp or wet conditions
<b>Multivariate analysis</b>	A statistical method of evaluating non linear relationships between groups of data.
<b>Rill</b>	Shallow erosion lines less than 30cm deep
<b>Xeric</b>	A dry, as opposed to wet (hydric) or mesic (intermediate) environment.

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## 7 ECOLOGICAL IMPACT ASSESSMENT

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This chapter presents the findings of the Ecological Impact Assessment (including Terrestrial Ecology, Aquatic Ecology and Avifauna) that was prepared by Mr. Simon Bundy (of SDP Ecological and Environmental Services (SDP)) as part of the EIA for the proposed Kenhardt PV 1 project within the Northern Cape Province.

### 7.1 INTRODUCTION AND METHODOLOGY

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#### 7.1.1 *Scope and Objectives*

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As noted in Chapter 1 of the EIA Report, the establishment of a PV facility exceeding thresholds stipulated within the EIA Regulations requires an Application for Environmental Authorisation to be submitted to the relevant, mandated authority (i.e. the National DEA), as well as the undertaking of an EIA Process. This Ecological Impact Assessment specialist study is being undertaken as part of the EIA Process in order to evaluate and study the bio-physical and ecological aspects of the receiving environment in relation to the proposed development.

This biophysical evaluation of a portion of the farm Onder Rugzeer 168 was undertaken during the period August to November 2015 and entailed both a literature review of the region, as well as on site evaluations, during which specific primary data was collected and evaluated. In addition, the identification of key ecological features on site and an interpretation of the prevailing habitat form were undertaken.

All data collected in the field and during the literature review was evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level, together with specific evaluation of data relating to habitat form and structure, in order to identify anomalies within the prevailing environment. Such variance may be considered to be indicative of differing habitat forms, which under consideration, may be of higher order ecological value in relation of the prevailing environment.

#### 7.1.2 *The Terms of Reference*

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The overall objectives of the Ecological Impact Assessment were to:

- Identify and establish an understanding of the site under consideration at a landscape scale of evaluation with particular consideration being given to aquatic or important terrestrial habitats, as they may be identified.
- Provide an evaluation and status of habitat composition and significance within the site in order to evaluate the potential impact of the proposed development on the ecological function of the site.
- Assess the actual and potential impacts arising from the proposed development on both the habitat and fauna within the study site. Such impacts may be directly applicable to the site and contained within the site boundaries, or may be indirect impacts, which may have ramifications outside of the site boundary, or may be of a cumulative nature in terms of impacts arising from similar developments or activities within the region.
- Provide guidance on the implementation of mitigation measures that may serve to moderate any negative impacts that may arise on site as a consequence of the development.

The Scope of Work is based on the following broad Terms of Reference, which have been specified for this specialist study:

- Review detailed information relating to the project description and precisely define the environmental risks to the terrestrial and aquatic environment (including avifauna) and consequences for ecology.
- Compile a baseline description of the terrestrial and aquatic ecology (including avifauna) of the study area, and provide an overview of the entire study area in terms of ecological significance and sensitivity (i.e. in terms of the major habitat forms within the study area, giving due consideration to terrestrial ecology (flora), terrestrial ecology (fauna) and freshwater ecosystems/wetlands).
- 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 sampling across the site to record relevant data and to compile an overview of the habitat under review.
- Collate all data collected during the field work and undertake a statistical review using methodologies that allows 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). Determine if a Water Use License is required.
- Undertake a faunal investigation on site based on the points identified during the preliminary aerial photographic interpretation.
- 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 (in line with the impact assessment methodology provided in Chapter 4 of the EIA Report) on the terrestrial and aquatic ecology, communities and ecological processes within the site during the construction, operation and decommissioning phases of the project.
- Provide input to the EMP, including mitigation and monitoring requirements to ensure that the impacts on the terrestrial and aquatic ecology are limited.
- Compile an assessment report qualifying the risks and potential impacts on terrestrial and aquatic ecology in the study area and impact evaluations.

### 7.1.3 Approach and Methodology

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A literature review and desktop analysis was undertaken prior to the field investigation, utilizing various sources including the South African National Biodiversity Institute (SANBI) data and other relevant sources. Recent and historical aerial imagery of the site was reviewed in order to identify points for investigation during the field survey.

Utilising the above information, a field investigation was undertaken during the early summer of 2015 (November), whereby:

- Sites of geomorphological or topographic variance were identified and subjected to an evaluation of species present within a 40 m transect established across the selected site. Species were identified and collated according to a “presence - absence” method of evaluation (Figure 7.1). A total of 10 transects were established on this site.
- Additional random sample points were selected from across the site for comparative purposes.
- Any additional species of significance (e.g. *Aloe dichotoma*), not identified within the sample sites were also noted.

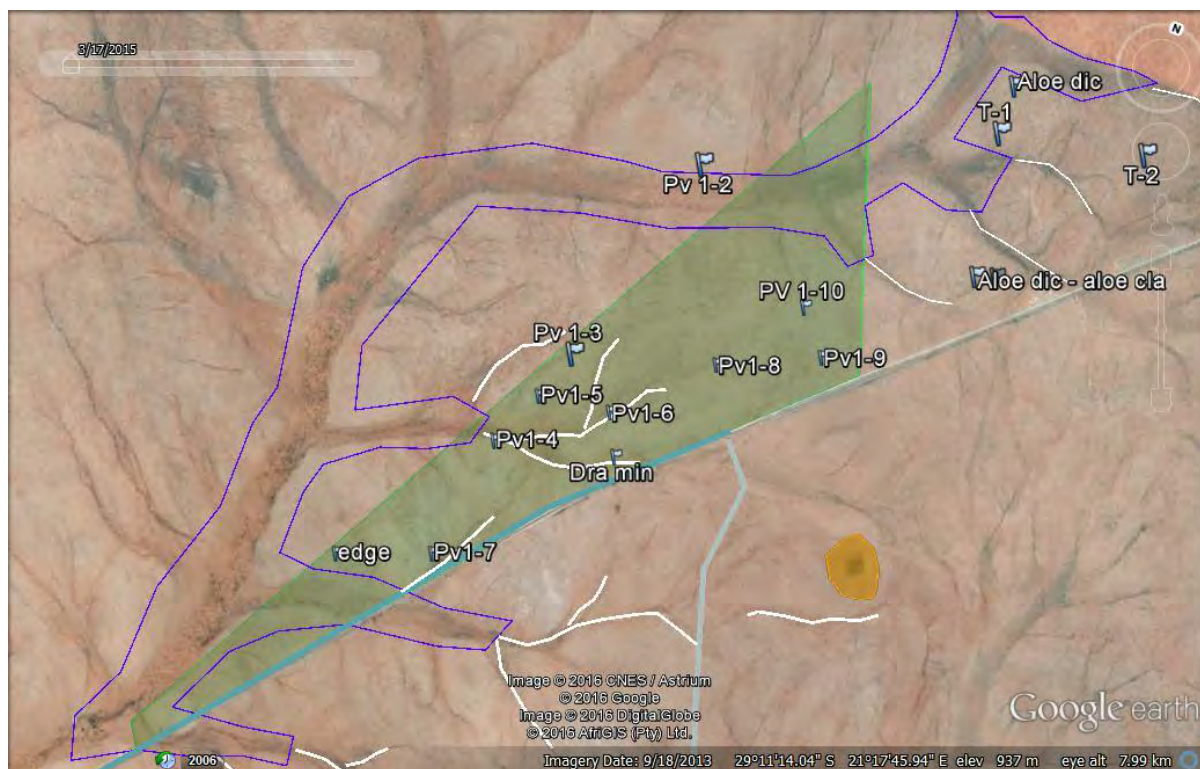


Figure 7.1: Aerial image of the Proposed Project Site indicating the Sample Points (e.g. Pv1-5) as well as major drainage lines (purple) and minor drainage lines (white) (Image Source: Google Earth, 2015). Not to scale.

All data was collated and subject to evaluation using multi-variate statistical methods in order to:

1. Place the data into a hierarchy of similarities according to species composition and sample sites.
2. Give consideration to the overall structure of habitat within the subject site.
3. Identify any habitat anomalies that may be identified in such analysis.
4. Allow for the interpretation of such data in order to prioritise and evaluate habitat form and structure within the study area

In addition, using methods identified in the Department of Water Affairs' "A Practical Field Procedure for Identification of Wetlands and Riparian Areas" (2005), wetland and riparian areas were identified. Such evaluations utilised both geomorphological, geohydromorphic edaphic conditions and botanical indicators in order to identify such components. In practise, only geomorphological components were utilised, as discussed below. Where riparian and wetland systems are identified and lie within 500 m of the proposed development/activity, an application in terms of Section 21 c and i of the National Water Act (1998) is required to be submitted to the mandated authority.

It is important to note that an alternative site for the proposed Kenhardt PV 1 project (referred to as Kenhardt PV 1b) was considered during the Scoping Phase. Only the preferred alternative has been assessed as part of this EIA Phase.



#### 7.1.4 Assumptions and Limitations

The site assessment and collation of data was undertaken during the period 3 - 7 November 2015, during a period of successional and unseasonably high temperatures and low rainfall (SA Weather Service, <http://www.weathersa.co.za> ). Such meteorological stressors mean that some botanical species, in particular graminoids and geophytes, are not generally evident. This may affect both the analytical and observation results of the investigation.

Allied to the above, the site investigation coincided with the regular, early summer dry period. As higher rainfall in the region is a late summer phenomenon, many botanical species remain dormant, until the advent of rains, effectively masking their presence.

As noted above, the assessment was undertaken using a random sampling method. As such minor outliers within the site may not have been evaluated. The random sampling method, if correlated to topography and other aspects, is however a robust method of evaluating habitat across a large area. Upon the finalisation of the detailed design of the proposed project, an evaluation of the final footprint should be undertaken (subsequent to the issuing of an Environmental Authorisation (should one be granted for the proposed project) and upon completion of the detailed engineering prior to the commencement of construction).

In terms of the assessment of potential cumulative impacts included in this specialist study, these take into consideration certain developments that occur with a 20 km radius of the proposed project, as shown in Chapter 4 of the EIA Report.

#### 7.1.5 Source of Information

This assessment was undertaken utilising:

- 1:50 000 topographic mapping sourced from the Surveyor General's office; and
- Aerial imagery sourced from Google Earth.

In addition, use was made of the following data:

- Wetland and riparian habitat GIS data sourced from the National Freshwater Ecological Priority Area Programme of SANBI;
- SANBI veld types data; and
- Literature as referenced.

#### 7.1.6 Declaration of Independence of Specialist

Refer to Appendix A of this EIA Report for the Curriculum Vitae of Mr. Simon Bundy and Mr. Andrew Blackmore, which highlights their 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.

##### BOX 7.1: DECLARATION OF INDEPENDENCE

I, Simon Bundy, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Kenhardt PV 1 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.

  
Simon Bundy

## 7.2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO TERRESTRIAL AND AQUATIC ECOLOGY (INCLUDING AVIFAUNA AND HYDROLOGICAL FEATURES)

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The proposed project will require the following key actions that are relevant to ecological aspects of the site:

1. Cordoning and fencing of the site during both the construction and operational phases. This component of the project usually entails the establishment of an electrified fence which remains *in situ* for the lifetime of the project (i.e. for the operational phase). For the construction phase, the construction area and construction site camp may also be cordoned off with temporary fencing.
2. Clearance or partial clearance of topographic features and significant vegetation where applicable during the construction phase.
3. Establishment of roadways (i.e. internal gravel access roads) and hardpanning of surfaces, with minor storm water management aspects being introduced during the construction and operational phases.
4. Establishment of module arrays with concomitant cabling and provision of invertors within arrays. The footing of the module framework is founded into the ground using an earthscrew or similar method. Cables are placed in trenches to a depth of approximately 1.0 m.
5. Establishment of step up transformer and the on-site substation. This facility is expected to occupy an area of approximately 2 ha. It is fenced and isolated from the balance of the site.
6. Establishment of offices and related infrastructure.
7. A yard for storage and general operations will be set aside, adjacent to the built offices.

The establishment of site will thus entail *low to significant* alteration of the prevailing habitat, depending upon the final design and layout of the PV facility. A general sequestering of the subject area, through the fencing of the site from the surrounding habitat forms thus arises.

A detailed project description is included in Chapter 2 of the Draft EIA Report, which includes dimensions and specifications of the proposed project components.

It is important to note that the information regarding the proposed 132 kV transmission lines is indicatively provided in this report. A detailed description of the transmission line corridor is provided and assessed separately in the Basic Assessment for the Kenhardt PV 1 - Transmission Line project.

## 7.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

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According to Mucina and Rutherford's veld type classification of 2006, Kenhardt and surrounding regions fall within the Bushmanland Arid Grassland veld type (NKb3). This veld type is located extensively south of the Orange River, but may include a number of smaller habitat forms within its broader extent.

The Kenhardt PV 1 study site can be described as a generally level portion of land, with a low gradient draining towards the west, into a shallow drainage feature known locally as "Wolfkopseloop" (Figure 7.2). This drainage line serves an area of approximately 280 km<sup>2</sup>, most of

which lies outside of the study area. Wolfkopseloop drains into the Hartebees River, which in turn serves the Sout River and Orange River systems. Also shown in Figure 7.2 is the Rugseers River which flows through the remaining extent of Onder Rugzeer Farm 168, however not within the area of Kenhardt PV 1. Figure 7.2 and Figure 7.3 show that the Wolfkopseloop River flows through a portion of the northern section of the study area for Kenhardt PV 1. The Wolfkopseloop system and its immediate tributaries may be regarded as major drainage features.

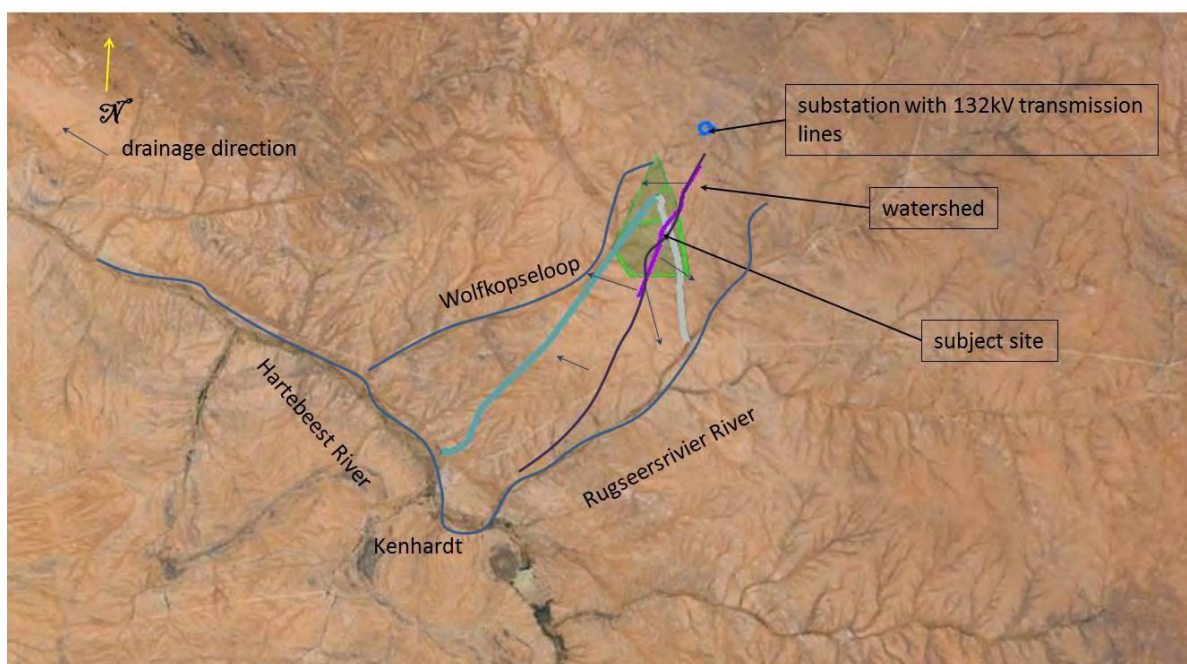


Figure 7.2: Map indicating Drainage lines associated with the Kenhardt PV 1 project area, including the two catchments of Wolfkopseloop and Rugseers River. (Source Google Earth, 2015 - not to scale)

The area in general can be considered to have a low rainfall of less than 200 mm per annum (SA Weather Services, [www.weathersa.co.za](http://www.weathersa.co.za)) although the recorded average rainfall for the period 2000 to 2012 approximates 238 mm within an average of 51 rain days per year ([www.worldweatheronline.com](http://www.worldweatheronline.com)). As such the area has been described as a “semi-arid region” (Bailey, 1979). Using the Koppen-Geiger climate classification method ([www.koepen-geiger.vu-wien.ac.at](http://www.koepen-geiger.vu-wien.ac.at)), the area is classified “BWh”, which is indicative of an *arid hot environment*, this classification is supported by Esler *et. al.*, (2006) who have defined areas with an annual rainfall of less than 200 mm as being “deserts”. This *desert* status may be the case in the Kenhardt region under its lower rainfall periods. In addition, the highest annual temperatures for the region are recorded between January and February, with maximum temperatures being 37°C ([www.worldweatheronline.com](http://www.worldweatheronline.com)). Extreme temperatures thus coincide with the peak rainfall period. Such correlation may give rise to the low groundwater recharge rates projected for the region, this being estimated at approximately 0.03 mm / annum (Musekiwa and Majola, 2011). Groundwater is described in greater detail in the Geohydrological Assessment (which forms Chapter 11 of the EIA Report).

With the above in mind, the most definitive physical drivers of the Bushmanland Arid Grassland veld type that lies within the study area, are meteorological and will relate to surface and subsurface hydrology. Other physical drivers will include localised geologies and edaphics.

### 7.3.1 Terrestrial Habitat and Vegetation

The proposed Kenhardt PV 1 (i.e. preferred) site lies to the north west of the Sishen - Saldanha railway line and its associated support road. The establishment of the railway line has altered surface hydrology on site, perhaps not only altering the nature of flow, but also the rate of flow and thus provision of water to the site from higher ground. Nonetheless, the area can be described as comprising of gently grading quartz dominated lands dissected by three major drainage features which serve the Wolfkopseloop drainage feature (Figure 7.3). These features drain the land in a westerly direction, with concentrated flow being evident in close proximity to Wolfkopseloop.

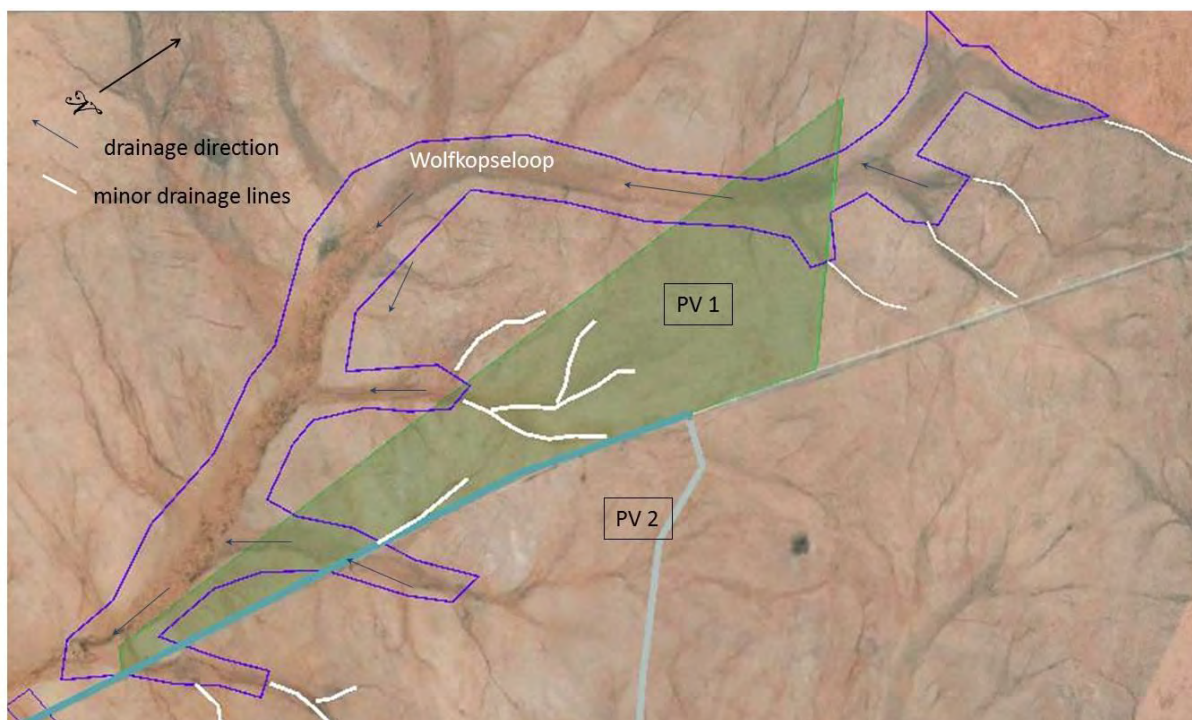


Figure 7.3: Aerial Image of the Study Site indicating major and minor drainage features in relation to the proposed project site. The Wolfkopseloop feature and its associated drainage lines, lying to the north of the site, are considered a major hydrogeomorphic feature and is outlined in purple. Minor dendritic drainage features are identified in white. Note Kenhardt PV 2, an adjacent proposed PV site that lies to the east of the study area (which is the subject of a separate assessment) (Source Google Earth, 2015 - not to scale).

Dendritic drainage features in turn serve these three main systems, and as indicated, many of these systems appeared to be confined by the placement of storm water drainage structures associated with the railway and road. Other factors that serve to alter surface drainage patterns include intermittent excavations, farm roads and related anthropogenic structures.

In general, the area appears to have been subject to extensive and significant grazing. At least three camps within the subject site appear to be in place at present, with significant grazing taking place on the more south westerly camp. The dominant vegetation form appears to be a *Rhigozum* - *Aristida* association, with quartz exposures showing limited vegetation cover and the absence of even succulents, which are plant types often associated with these features (Figure 7.4). The prevailing vegetation form covers the site in its entirety, although within drainage features more verdant associations and consociations of *Rhigozum trichomotum* and *Aristida* spp can be identified along with *Stipagrostis ciliata*. A list of species identified across site is presented in Table 7.1, below.

**Table 7.1: List of observed species within study site. Species of conservation significance are identified.**

Species	Conservation Significance	
	NC NCA *	NFA#
<i>Acacia karroo</i>		
<i>Acacia mellifera</i>		
<i>Aizoon elongatum</i>		
<i>Aloe dichotoma</i>	X	
<i>Aloe claviflora</i>	X	
<i>Aptosimum spinescens</i>		
<i>Aristida ascensionis</i>		
<i>Aristida congesta</i>		
<i>Asparagus suaveolens</i>		
<i>Atriplex lindleyi</i> \$		
<i>Blepharis capensis</i>		
<i>Cadaba aphylla</i>		
<i>Chrysocoma ciliata</i>		
<i>Enneapogon scaber</i>		
<i>Datura ferox</i> \$		
<i>Enneapogon cenchroides</i>		
<i>Eragrostis nindensis</i>		
<i>Eriocephalus encoides</i>		
<i>Euphorbia glanduligera</i>		
<i>Euphorbia stellispina</i>		
<i>Felicia muricata</i>		
<i>Lessertia annularis</i>		
<i>Lyceum cinereum</i>		
<i>Mesembryanthemum guerichianum</i>		
<i>Monechma incanum</i>		
<i>Osteospermum spinescens</i>		
<i>Pentzia spinescens</i>		
<i>Prosopis glandulosa</i> \$		
<i>Rhigozum trichotomum</i>		
<i>Riccia albornata</i>		
<i>Salsola tuberculata</i>		
<i>Schmidtia pappophoroides</i>		
<i>Stipagrostis anomala</i>		
<i>Stipagrostis ciliata</i>		
<i>Tetragonia arbuscular</i>		
<i>Tribulus cristatus</i>		
<i>Tribulus pterophorus</i> \$		

\*NC NCA = Northern Cape Nature Conservation Act (1998)

#NFA = National Forest Act (1998)

\$ = exotic



Figure 7.4: View of a portion of the proposed Kenhardt PV 1 Site. Note quartzite exposure central to the image.

In order to further evaluate the nature of the prevailing habitat on site, the primary collection of data relating to species composition across the proposed site was undertaken. As mentioned previously, a total of ten sites were evaluated on a *presence - absence* basis, using a 40 m transect (Figure 7.1). Utilising the data collected from the sites, a two way indicator species analysis (TWINSPAN) was undertaken to discern any similarities and variation between vegetation. The dendrograms depicting the results for vegetation on site are presented in Figure 7.5.

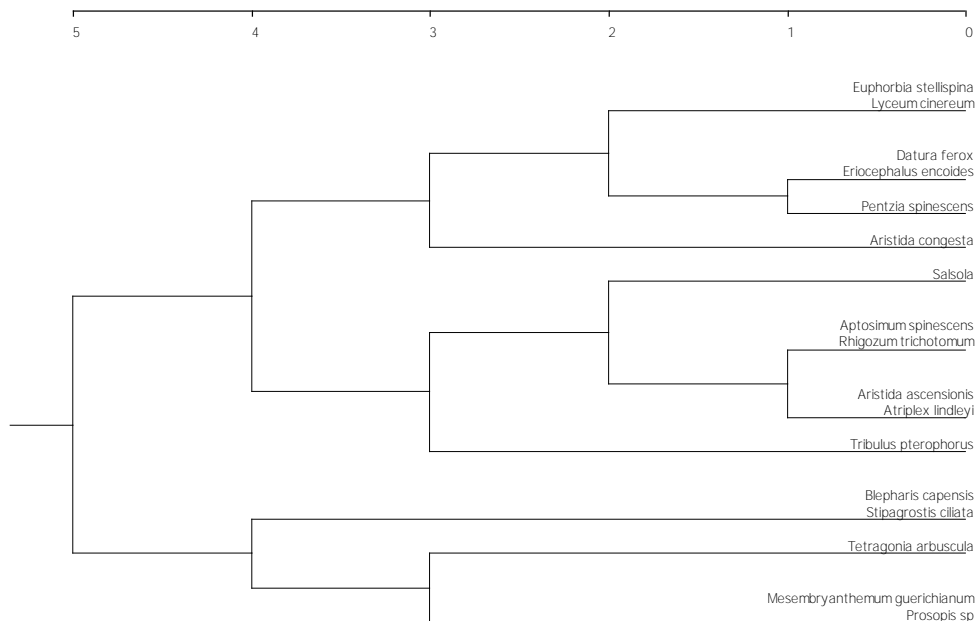


Figure 7.5: TWINSPAN Results presented as a dendrogram indicating vegetation species similarities and association.

Figure 7.5 also identifies a number of key features within the prevailing habitat, namely that there are three prevailing associations which can be identified, these being;

- An association of generally heavily grazed areas associated with the presence of amongst other species, *A congesta* and *Pentzia spinescens*.
- An association which includes *Aptosimum spinescens* and *R trichomotum*, which is also indicative of high grazing pressures, but may indicate other physical drivers such as edaphic variations.
- An association which includes *S ciliata* and the exotic *Prosopis* sp.

In order to identify any similarity of habitat across the site, use of TWINSpan was further undertaken in order to group the various sample sites. Figure 7.6 below presents a dendrogram of the results.

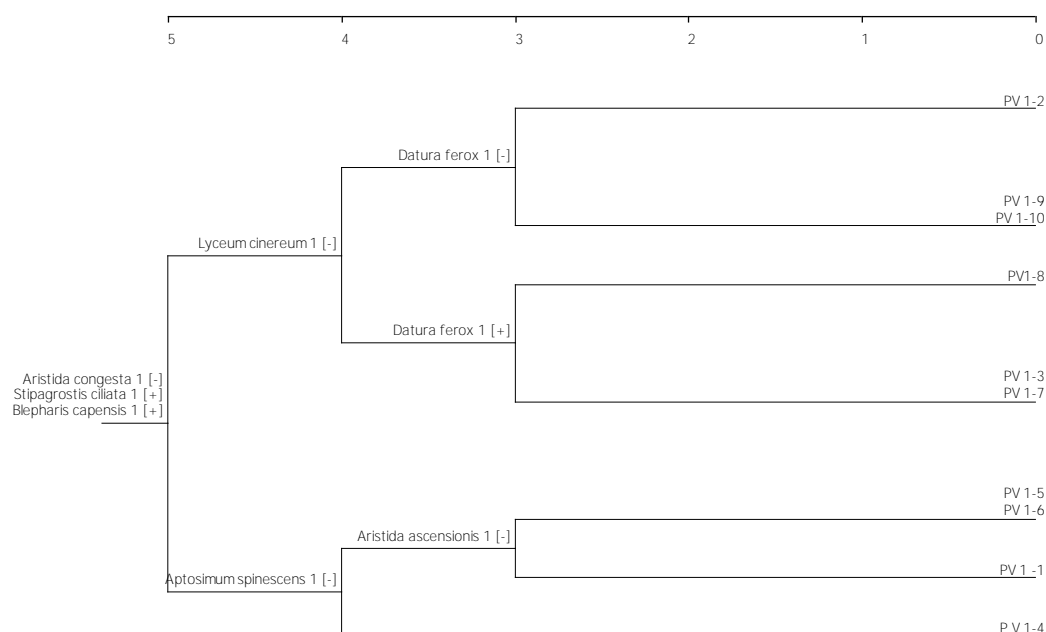


Figure 7.6: TWINSpan results presented as dendrogram indicating sample sites according to species composition.

Figure 7.6 indicates that there appears to be no significant variation in the distribution of the various vegetation associations across the site. As such, this result is probably indicative of the high grazing pressure on the land, which is the dominant master factor affecting the site, while soil (depth) and geology may be of lesser significance.

### 7.3.2 “Aquatic” and Riparian Habitat

As indicated above, surface drainage on site relates to three major drainage lines which serve the Wolfkopseloop drainage feature. These three drainage features do not show specific hygrophilous vegetation characteristics as may be defined, nor do they show the presence of geohydromorphic soils, primarily on account of the fluctuating levels of inundation over extended periods of time which is driven by the intensity and erratic rainfall experienced in this region. Interaction with the farmer presently utilising the land in question, indicated that the drainage lines show short term inundation during high rainfall periods, “every 4 to 5 years” (S Strauss *pers. comm.*). Flow is sluggish under these conditions, and following the cessation of rains, the water rapidly drains from site on account of the percolative, sandy conditions, or is lost to evaporation. For this reason, the major drainage lines have been delineated according to hydrogeomorphological features and an

apparent change in vegetation form from a sparse and arrested growth form to a more verdant state (Figure 7.7). Hydrogeomorphological features are indicated primarily by evidence of flow or deposition of materials (Brinson et al 1993; USDA 2008) while verdant vegetation establishment is a combination of both improved plant water relations and increased nutrient availability. Therefore major drainage features were allied with a combination of both vegetation structure and significant geohydromorphic indicators, while minor drainage features were distinguished through the presence of a more verdant vegetative association and in some cases indicators of minor surface flow ('rills').

The interface between major and minor drainage lines is often vague, however where rills exceeded a depth of 30cm (gullies), such features were defined as 'major' drainage systems.



**Figure 7.7:** An image indicative of a minor drainage feature located within the site. Note the verdant vegetation state compared to adjacent vegetation forms which appear arrested in growth.

Although ephemeral in terms of the presence of water within these features, these drainage lines do bestow intermittent hydrological benefit to the landscape and can be considered groundwater "recharge zones" in respect of the local subsurface hydrology. From a biotic perspective, the drainage lines do serve as seasonally important refugia and congregation points for *inter alia* invertebrates (e.g. Class Odonata) and vertebrates (e.g. Order Anura) (faunal aspects are described further in Section 7.3.4 of this chapter).

Figure 7.3 indicates the position and extent of the major drainage features, with minor dendritic features (those features that show only minor indications of flow and some vegetation change), also being identified. The evident differentiation between the major and minor drainage features is highlighted in the mapping imagery. The former are considered to be important ecological factors within the landscape, while the latter are of less significance, but should be given consideration, where they may intersect with the development footprint of the proposed solar PV facility.



### 7.3.3 *Habitat Sensitivity*

Appendix 7.A indicates zones that should be subject to exclusion from any proposed development within the study site. These zones relate to the major drainage features that are associated with and proximal to the Wolfkopseloop drainage system. No additional sites of ecological significance that should be excluded from the development footprint have been identified.

A 32 m “buffer” or “setback” around the major drainage lines has been established, which is an indicative “norm” recommended by the various authorities. This buffer is to be established and applied around the major drainage systems. This buffer is considered acceptable in light of the fact that hydrogeomorphic features are the primary dictate in the identification and delineation of the major drainage lines, rather than other functional features such as geohydromorphic soil conditions or botanical species diversity and compositional variation. It is evident that a 100m exclusion area around the major drainage lines would incorporate extensive tracts of land which are in no way indicative of the concentrated surface hydrology. The application of 32m from such features is expected to accommodate both the variation in habitat structure and the erosive action associated with gullies and larger drainage features.

The “minor” drainage features are not considered to require exclusion from any land use change or a development akin to that proposed on account of:

1. The transformed surface hydraulics arising from the establishment of the railway line and its associated storm water management infrastructure.
2. Other anthropogenic interventions, such as borrow pits and roadways, which have further altered surface drainage.
3. The origins of many of the minor features, as explained above.
4. The generally benign impact of solar arrays on surface flow, as indicated in Figure 7.8.



Figure 7.8: Image of solar arrays indicating the limited influence that such structures generally have on the flow of surface waters within a solar facility.

Therefore, based on the above, the minor drainage lines occurring within the site do not require avoidance. It would however be best for the design of the proposed solar PV facility to note the presence of these minor features and avoid establishing structures such as transformers, buildings and other permanent and significant structures within them. If necessary, it would be best to incorporate the minor drainage lines into the solar arrays (as shown and explained above).

### 7.3.4 Fauna

#### 7.3.4.1 Terrestrial

Fauna on site is considered to be typical of a xeric environment, with limited habitat variation across the study area. Table 7.2, below indicates species or evidence of their presence observed on site and includes species that are likely to be encountered on site. The occurrence of such species is likely in respect of these animals either utilizing the site as refugia or as part of a wider foraging range or territory.

As is typical of the region, a large number of fossorial and burrowing species, including mammals and invertebrates, were identified across the site in general. Such species included suricates (meerkat) (*Suricata suricata*) and ground squirrel (*Xerus inauris*), these species living in mutual habitation within active burrows (Figures 7.9 and 7.10). In addition, foraging excavations indicating the presence of aardvark (*Orycteropus afer*), as well as the porcupine (*Hystrix africae australis*) were evident.

Other larger mammals that were noted on site include Springbok (*Antidorcas marsupalis*), which are prevalent across the area and may be accompanied by Steenbok (*Raphicerus campestris*), which are also common in the region and open habitat (Estes, 1992).

Most larger mammals located within the subject site are not reliant upon the study area in particular and are likely to forage over extensive ranges that extend beyond the study area. Estes (1992) indicates that suricates may use warrens for a number of months or possibly years, before relocating. Noted on other PV sites, suricates are quite capable of establishing warrens within solar parks following their construction, while aardvark (*Orycteropus afer*) and other fossorial species are capable of excavating under fencing, which may initially serve to exclude them from an area.



Figure 7.9:  
Suricate warren  
located on site.



Figure 7.10: Ground squirrel (*Xerus inauris*).

Table 7.2: List of terrestrial species identified within the site and likely to be present within the region/site. Species of conservation importance are also Identified.

		Observations	TOPS (2007)	Conservation Importance (IUCN Red List) *
<b>Mammals</b>				
<i>Orycteropus afer</i>	Aardvark	Foraging evidence?		LC
<i>Felis nigripes</i>	Black-footed cat			VU
<i>Atelerix frontalis</i>	South African hedgehog	Pers.comm J Orven	Protected	LC
<i>Canis mesomelas</i>	Black back jackal			Not listed
<i>Xerus inauris</i>	Cape ground squirrel	Observed		Not listed
<i>Lepus capensis</i>	Cape hare	Observed		Not listed
<i>Felis caracal ?</i>	Caracal ?	Remains of prey		Not listed
<i>Procavia capensis</i>	Rock dassie	Observed		LC
<i>Suricata suricatta</i>	Meerkat	Observed		LC
<i>Aethomys namaquensis</i>	Namaqua rock mouse			Not listed
<i>Hystrix africaeaustralis</i>	Porcupine	Foraging evidence?		LC
<i>Antidorcas marsupalis</i>	Springbok	Observed		LC
<i>Raphicerus campestris</i>	Steenbok			LC

		Observations	TOPS (2007)	Conservation Importance (IUCN Red List) *
<i>Cynictis penicillata</i>	Yellow mongoose	Observed		LC
<b>Reptiles</b>				
<i>Ptenopus spp</i>	Barking gecko			LC
<i>Naja nivea</i>	Cape cobra			Not listed
<i>Chondrodactylus angulifer</i>	Giant ground gecko			LC
<i>Cordylus spp</i>	Girdled lizard		Protected	<i>C cataphractus</i> ; - VU
<i>Psammobates tentorius</i>	Karoo tent tortoise			Not listed
<i>Geochelone pardalis</i>	Leopard tortoise	Observed		Not listed
<i>Bitis arietans</i>	Puff adder			Not listed
<i>Agama makarikarica</i>	Spiny agama			Not listed
<b>Amphibians</b>				
<i>Tomopterna cryptotis</i>	Tremolo sand frog			LC
<b>Invertebrates</b>				
<i>Locustana pardalina</i>	Brown locust	Observed		Not listed
<i>Pterinochilus spp</i>	Baboon spider		Protected	Not listed
<i>Seothyra spp</i>	Buckspoor spider			Not listed
Family Vespidae	Various wasps	Observed		
Opisthophthalmus spp	Burrowing scorpions?	Burrow entrance?	Protected	Not listed
Parabuthus spp	Parabuthid scorpion			Not listed
Family Hodotermitidae	Termite			Not listed

TOPS - Threatened or Protected Species (GN R151 of the National Environmental Management: Biodiversity Act (Act 10 of 2004))

IUCN - International Union of Conservation Networks

\* LC = Least concern; NT = Near threatened; VU = Vulnerable; EN = Endangered

CR = Critically Endangered; EW = Extinct in the wild; NE = not evaluated; DD = data deficient

#### 7.3.4.2 Avifauna

As the study area is located in an arid region, it is expected that the avifaunal densities will be low, typical of the Bushmanland Arid Grassland environment. Consideration of the birds observed on site during the beginning of November 2015 (Table 7.3) and the Southern African Bird Atlas Project (SABAP) sighting data (see <http://sabap2.adu.org.za/>) indicates that the solar park presents a limited risk to the avifaunal community.

The SABAP data indicates three species of potential concern. These species are two raptor species - the Pygmy Falcon (*Polihierax semitorquatus*) and the Southern Pale Chanting Goshawk (*Melierax canorus*), and the Kori Bustard (*Ardeotis kori*). The predatory flight habit of the raptor species is such that they are likely to avoid collision with the solar panels and associated infrastructure. It is, however, to be recognised that the powerlines, pylons, fencing and other erect infrastructure provides these species with artificial perching points. This, as has been recorded elsewhere,

provides both the falcon and goshawk a predatory advantage, increasing their prey species vulnerability. Given the current low numbers of these artificial perches, this impact is considered *low to moderate* at a site specific level and *low* at a landscape level. Caution is however raised that with an increase in the number of artificial perching points in the future, the resultant cumulative impacts are likely to become significant at a landscape level with consequential changes in terms of the localized ecology. This has a generally “negative” outcome in terms of population equilibria in the region. The assessment of this potential impact is assessed in Section 7.6 of this chapter.

The Kori Bustard is classified as ‘Near Threatened’ and is particularly vulnerable to collision with powerlines. At these points the placement of *Bird Flight Diverters* (BFD) or bird flappers along the powerlines is advised as a suitable mitigation (which has been assessed as part of a separate Basic Assessment Process). Given the paucity of wetlands and open water within that landscape, the impact of the proposed solar PV facility on wetland avifauna is considered negligible. As indicated above, drainage features in the form of gullies show an extremely limited presence of flow or indeed the presence of water. Water fowl in the region are to be considered transitory in nature or associated with times of inundation of the abovementioned drainage features. There may be some disturbance to migratory wetland birds in that the solar panels may appear as open water. While this is a concern, to date there is no data (in areas of higher wetland bird densities) to show that this phenomenon poses a significant threat to wetland birds. Finally, given the abundance of habitat surrounding the proposed solar farm, the loss of habitat integrity as a consequence of the establishment of the PV facility is likely to have a low measurable impact on avifauna. Notwithstanding this observation, the continued and cumulative loss of habitat at a landscape to regional level is a possible matter of concern.

**Table 7.3: Species noted within and adjacent to the study area.**

		Observations
<b>Aves</b>		
<i>Cercomela schlegelii</i>	Karoo chat	Observation on site
<i>Cisticola aridulu</i>	Desert cisticola	Observation on site
<i>Corvus albus</i>	Pied crow	Observation off site
<i>Egretta garzetta</i>	Little Egret	Observation off site
<i>Lanius collaris</i>	African fiscal	Observation off site
<i>Melierax gabar</i>	Gabar goshawk	Observation off site
<i>Oena capensis</i>	Namaqua dove	Observation on site
<i>Philetairus socius</i>	Weaver, sociable	Proximal nesting site
<i>Streptopelia capicola</i>	Cape turtle dove	Observation off site
<i>Streptopelia senegalensis</i>	Laughing dove	Observation off site

## 7.4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The proposed establishment of a PV facility within the study site is considered to elicit a requirement for compliance with the following legislation.

1. The National Environmental Management: Biodiversity Act (Act 10 of 2004)
2. The National Water Act (Act 36 of 1998)
3. The National Forest Act (Act 84 of 1998)
4. The Northern Cape Nature Conservation Act (Act 9 of 2009)
5. The Conservation of Agricultural Resources Act (Act 43 of 1983)

The potential applicability of the abovementioned acts to the subject site is provided below:

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

This Act serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. The proposed development, taking place in the identified Bushmanland Arid Grassland environment, may not necessitate any particular application for a change in land use from an ecological perspective, however the effective disturbance and removal of species identified in Tables 7.1 and 7.2, as well as possible other species (i.e. TOPS species), will require specific permission from the applicable authorities.

In addition, the planting and management of exotic plant species on site, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.

### 2. The National Water Act (Act 36 of 1998)

The National Water Act controls activities in and around water resources, as well as the general management of water resources, including abstraction of groundwater and disposal of water. Authorisation for changes in land use, up to 500 m from a defined water resource/wetland system will require an application for a Water Use License from the Department of Water and Sanitation. A Water Use License will be required in respect of the proposed development under Section 21 (c) and (i), of the Act, however such License should not preclude this development.

### 3. The National Forest Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified “protected trees”. Listed species that may be encountered with the site include *Boscia* spp and possibly *Acacia erioloba*.

It is unlikely that an application for the “clearing of a *natural forest*”, as defined within the Act, will be required on the site in question.

### 4. The Northern Cape Conservation Act

The Northern Cape Conservation Act under its pertinent regulation governs the disturbance of species listed in Tables 7.1 and 7.2 above, or possibly other species not yet identified on site. A permit from the Provincial Department of Environment and Nature Conservation will be required in order to disturb or translocate such species.

### 5. The Conservation of Agricultural Resources Act

Invasive plant species that should be removed or maintained only under certain commercial situations are identified in terms of the Conservation of Agricultural Resources Act (CARA). This Act will be applicable to the project if and where such plants arise within or adjacent to the project area. Notably most listed alien invasive species are propagated and driven by the disturbance of land during and following construction.

As the proposed sites are not within protected areas, nor within 5 kilometres of a protected area, are not within 10 kilometres of a World Heritage site and do not form part of a critical biodiversity area (CBA), the various regulations within the National Environmental Management Act and the NEM Protected Areas Act are not applicable to this site. It is also noted that the site does not fall within any expansion area in terms of a conservation strategy for the Northern Cape.

## 7.5 IDENTIFICATION OF KEY ISSUES

### 7.5.1 Key Issues Identified During the Scoping Phase

As indicated in both this report and the environmental scoping report, the subject site is to be considered a xeric environment, with limitations in the presence of aquatic or wetland environments in both temporal and spatial terms. With this in mind, the consideration of issues arising from the proposed development is considered at an integrated level as they may arise. The following key issues were identified during the Scoping Process and are summarized below:

#### **Construction Phase:**

1. The ousting of fauna and loss or change in vegetation through anthropogenic activities, disturbance of refugia and general change in habitat.
2. Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure, within the site and immediately adjacent to it.
3. Alteration of surface water quality on account of construction activities that lead to change in water chemistry.
4. Depending upon the origin of water for construction (import or through abstraction of groundwater), changes in subsurface water resources may arise, particularly in the case of the latter.
5. Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points. This may have further ramifications in terms of exotic weed invasion following disturbance.
6. Increased electrical light pollution, leading to changes in nocturnal behavioural patterns among fauna.
7. Exclusion or entrapment of (in particular) large fauna, on account of the fencing of the site.

#### **Operational Phase:**

1. Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the proposed PV facility i.e. larger fossorial species and predators will be excluded from the PV facility site by virtue of its fencing, generally leading to possible variations in populations of other species that remain within the site, with concomitant ecological change.
2. Increased shading as a consequence of the PV arrays, will lead to changes in plant-water relations and possible changes in plant community structures within the site.
3. Changes in meteorological factors at a local scale, on account of the proposed PV array is likely to arise (e.g. subtle changes in wind dynamics, “heat bubble phenomenon” as well as the alteration in run off of surface water and evapotranspiration states), leading to long term, but generally latent changes in habitat.
4. Potential abstraction of groundwater for the cleaning of modules, as well as operational use, will alter the state of sub surface water resources, depending upon nature and origin of such water.
5. Possible overhead medium voltage (33 kV) transmission lines (i.e. those that will be constructed to connect the on-site converter station to the proposed on-site substation), as well as subtle changes in habitat are likely to result in the alteration of avian behaviour in and around the site. It is important to re-iterate that the impact of the proposed 132 kV overhead transmission line, extending from the Kenhardt PV 1 site to the national grid system via the Eskom Nieuwehoop Substation, has been assessed in a separate Basic Assessment Process.
6. The fencing of the site, possibly with electric fencing, is likely to impact upon faunal behaviour, leading to the exclusion of certain species and possible mortalities.

Alternatively, such changes may also favour some specific individuals, particularly those that remain within the confines of the PV facility, which is likely to lead to further localised alteration of habitat and ecological processes within the proposed PV facility.

In terms of comments from I&APs and authorities, the Scoping Report was released for a 30-day comment period which extended from 25 September 2015 to 27 October 2015. The Addendum to the Scoping Report was also released for a 30-day comment period, extending from 6 October 2015 to 5 November 2015. To date, the following comments and issues have been raised by I&APs in relation to ecological impacts. Chapter 6 of the EIA Report includes the complete list of comments and responses.

COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<p>Point 3 - The proposed development do not form part of the Strategic Environmental Assessment (SEA) for Eskom's electricity grid upgrades and roll-outs as it falls outside one of the corridors identified by Eskom (i.e. the Western Corridor; one of the five identified corridors; refer to Figure 3). Comprehensive field surveys (within appropriate seasons) should thus be done for this specific area; it didn't form part of Eskom's assessment and the former project's surveys can thus not be used as baseline studies.</p> <p>Caption Figure 3 - Strategic Environmental Assessment (SEA) for ESKOM's electricity grid upgrades and roll-outs (Feb 2014) in relation to the proposed development (black arrow) near Kenhardt The proposed development falls outside one of the corridors identified by ESKOM (i.e. the Western Corridor; one of the five identified corridors), hence, it didn't form part of Eskom's assessment.</p>	<ul style="list-style-type: none"> <li>Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> <li>5 November 2015 (Letter via email)</li> </ul>	<p>1. Refer to the response provided in Chapter 6 of this EIA Report regarding the SEA for the Eskom Electricity Grid Infrastructure SEA.</p> <p>2. Field and desktop investigations have been undertaken during November 2015. The primary data collated on site and the sampling regime employed has been extrapolated to consider other seasonal variations.</p>
<p>The Department of Water and Sanitation (DWS) hereby acknowledges receipt of your scoping and environmental impact assessment for the proposed development of three Solar Photovoltaic Facilities (Referred to as Kenhardt PV 1, Kenhardt PV 2 and Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province. The department has reviewed the document and the comments are as follows:</p> <ul style="list-style-type: none"> <li>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.</li> <li>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 storm water flow. Where necessary, works must be constructed to attenuate</li> </ul>	<ul style="list-style-type: none"> <li>Ms Chantèl Schwartz, Orange Proto- CMA, Department of Water and Sanitation</li> <li>3 November 2015 (Email)</li> </ul>	<p>1. 100m set back has been noted, however given the fact that hydrogeomorphological indicators and vegetation structure have been used to delineate drainage features; a 100m non-development area around such features is considered excessive. The use of the more conservative 32m buffer is appropriate as this incorporates the identified vegetation indicators and provides a cordon around the erosive edges of such hydrological features.2. Advisory on dispersal of storm water is noted and it is proposed that engineering and layout of the site will</p>



COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<p>the velocity of the storm water discharge and to protect the banks of the watercourse.</p> <ul style="list-style-type: none"> <li>▪ Please note that no taking of water or storing of water from the water resource shall be lawful without a water use authorisation. Due to the high number of renewable energy projects that are taking part in the Department of Energy (DOE) bidding process, this Department (DWS) will only process applications for water use authorisations received from developers who have attained preferred bidder status. Developers who wish to submit applications for water use authorisations may however proceed to do so, with the understanding that their applications will be processed as soon as we have confirmation of their status with the DOE. Attached to this letter is Annexure 1 that details information, which must be submitted as part of the application for water use authorisation.</li> </ul>		<p>accommodate this requirement.</p> <p>3. Applicant has been advised and is aware of the Water Use License requirements.</p>
<p>Point 6 - It is advisable that RE facilities are not proposed for areas that favour local faunal diversity (e.g. endorheic pans, dry river washes, rocky outcrops, etc.).</p> <p>The Northern Cape is water scarce province, hence any form of sustained water, has the potential to stimulate vegetative growth and attract faunal species.</p> <p>Above-mentioned areas should be noted as sensitive areas during the EIA phase.</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> <li>• 5 November 2015 (Letter via email)</li> </ul>	<p>1. Habitat that favours faunal diversification and increased faunal populations have been excluded from the “development area”</p> <p>2. Features mentioned have been incorporated into the assessment.</p>
<p>Point 1 - It should be noted that the areas where the proposed developments are to be constructed have been historically poorly surveyed, hence extrapolations from desktop studies for specialist’s studies will give an incomplete representation of the biodiversity within the area (refer to Figure 2).</p> <p>Caption Figure 2- South African National Biodiversity Institute’s (SANBI) PRECIS database (2013) indicating the number of plant specimens collected for specific Quarter Degree Grid Squares (QDGS). The proposed development falls within QDGS indicative of a very low species count (i.e. 1 - 50 species sampled per grid). Red squares denote zero specimens.</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> <li>• 5 November 2015 (Letter via email)</li> </ul>	<p>1. Field reconnaissance was undertaken during assessment.</p> <p>2. PRECIS data base noted and confirmed.</p>
<p>Point 2 - Large Aloe dichotoma populations are known to occur in the region. The species is protected under the Northern Cape Nature Conservation Act (Act 9 of 2009) and at present there is a moratorium in place in the Northern Cape on the removal of A. dichotoma</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District</li> </ul>	<p>A <i>dichotoma</i> was noted in adjacent lands but excluded from possible development areas.</p>

COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<p>from the wild due to historic trade related pressures on populations (Proclamation No 968, 1 April 2005). Hence, trees may not be removed until the moratorium is lifted. All trees within the development or close proximity thereof should be mapped and information provided with the EIA documents.</p>	<p>Ecologist), Northern Cape Department of Environment and Nature Conservation 5 November 2015 (Letter via email)</p>	
<p>Point 5 - The development is proposed for an area that falls within the Bushmanland Arid Grassland, one of the most extensive vegetation types within the Northern Cape (Mucina and Rutherford, 2006). This vegetation types is poorly conserved in formal protected areas and extensive areas have been historically overgrazed. As a result, large areas are currently degraded and drainage lines have been modified as a result of anthropogenic impacts. As a result of the extent of the area, impact would most likely be on landscape connectivity as the site is in close proximity of drainage lines and wetlands (refer to Figure 5).</p> <p>Caption Figure 5 - Several landscape scale connections through drainage lines are evident within the area in question. The two proposed facilities i.e. the Three Solar PV (blue arrow) and Seven Solar PV (black arrow) are to be located in close proximity of drainage lines and wetlands.</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> <li>• 5 November 2015 (Letter via email)</li> </ul>	<ol style="list-style-type: none"> <li>1. Connectivity identified and preserved.</li> <li>2. Drainage lines that are considered to be major watercourse features are excluded from development.</li> </ol>
<p>Point 9 - It is advised that the consultants for this project liaise with the Forestry branch of the Department of Agriculture, Forestry and Fisheries (DAFF) if trees protected under the National Forest Act (Act No. 84 of 1998) are to be impacted by the proposed development.</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> <li>• 5 November 2015 (Letter via email)</li> </ul>	<ol style="list-style-type: none"> <li>1. All protected trees identified on site are excluded or to be avoided in the final layout or construction of powerlines/associated electrical infrastructure.</li> </ol>
<p>Point A. Specialist's studies:</p> <ul style="list-style-type: none"> <li>▪ A thorough baseline survey of the grids 2921AB and 2921AD should be conducted during the EIA phase with at least the following biotic specialists: Ornithologist, Mammologist, Herpetologist (including amphibians) and Botanist. <ul style="list-style-type: none"> <li>○ Surveys for both the faunal and floral specialist reports should be done during the most optimum period for this area i.e. mid-summer to autumn, after the rains and during the growth season when maximum biota can be expected.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> <li>• 5 November 2015 (Letter via email)</li> </ul>	<ol style="list-style-type: none"> <li>1. An ecologist, ornithologist and aquatic specialist comprised part of the team.</li> <li>2. Timeframes do not allow for February to April period assessment. Drought period and meteorological state is noted at time of assessment.</li> <li>3. Timeframes do not allow for continued long term assessments. Interpretation of</li> </ol>

COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<ul style="list-style-type: none"> <li>○ This should be done in order to give a good representation of the ecology in the area.</li> <li>○ Due to the extreme variability in time and space of rainfall events, even a once-off survey within the rainy season will not provide a representative picture of the ecology of the area.</li> <li>○ The number of plants of conservation concern (e.g. Aloe dichotoma, Aloe spp., Trichocaulon spp., Hoodia spp., Boscia spp. etc. under the Northern Cape Nature Conservation Act No. 9 of 2009 and National Environmental Management: Biodiversity Act No. 10 of 2004, etc.) that may be directly affected by the development must be estimated during the EIA phase.</li> <li>○ Large Aloe dichotoma [NCNCA protected spp.] populations are known to occur in the region and any populations in close proximity to the planned facilities must be mapped.</li> </ul>		<p>landform, floral and faunal findings and multivariate analysis has been used to interpret and compile assessment. Given the findings of the assessment and the general severely grazed nature of the site, the information collated is considered sufficient to draw a conclusion on the nature of the ecology within the area.4. Identified specimens included under NEMBA have been identified and mapped spatially.</p>
<p>Point C - Ecology and landscape connectivity:</p> <ul style="list-style-type: none"> <li>▪ The proponent should include in the EIA an environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process and map combining the final layout plan overlain on the environmental sensitivity map. This map should be adequate in size to determine the extent of the development and to identify all aspects adequately as indicated on the maps. No-Go areas should be clearly identified.</li> <li>▪ The final layout of the proposed developments (all 3 phases) and its constituents should be designed in such a manner as to enhance ecological value to fauna and flora within the area and to avoid pressures associated with surrounding farmland i.e. natural areas for greening and designing to support ecological corridors and landscape connectivity are strongly encouraged.</li> <li>▪ The actual footprint for all activities related to the whole project (all Solar Park facilities) must be calculated to determine the total natural vegetation land cover transformation and loss. The collective and residual impact of all developments will be assessed also during permit applications. If the collective</li> </ul>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation 5 November 2015 (Letter via email)</li> </ul>	<ol style="list-style-type: none"> <li>1. 'Sensitivity' map has been included in the assessment (i.e. Appendix 7.A of this chapter).</li> <li>2. Recommendations in respect of the proposed layout have been included in report.</li> <li>3. The proposed facility (Kenhardt PV 1) is expected to have a total footprint of 250 ha. The final siting of the proposed facility will be located outside of sensitive areas, where applicable.</li> <li>4. Recommendations on fencing and the use of electric fencing have been identified in report.</li> <li>5. The proposed project will either make use of the existing unnamed farm road or the Transnet Service Road to gain access to the proposed project site. Should the Transnet Service Road or farm</li> </ol>

COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<p>impact is assessed early enough the developer can better manage his risks and costs as he/she would know in advance whether a biodiversity offset is triggered also under DENC.</p> <ul style="list-style-type: none"> <li>▪ If electrification of the property as security measure is considered, possible electrocution damage to small mammals such as pangolin and tortoises should be taken into consideration.</li> <li>▪ Existing roads must be used as far as possible.</li> <li>▪ The EIA should indicate how the Social-Agricultural-Conservation dynamic will change in terms of land use. Will the properties on which the developments occur still be actively farmed or will they become dormant or effectively be converted into conservation land with minimal land use management. Will problem animal control still occur as in standard practice in small livestock farming? How will fencing infrastructure change around the properties which has a bearing on problem animal control, but also on wildlife movement and landscape connectivity.</li> <li>▪ The application must also be reviewed in the context of cumulative impacts of all RE developments in the region.</li> </ul>		<p>road be considered the preferred access road, it is proposed that an internal gravel road will be constructed from the road to the proposed site. This internal gravel road is not expected to exceed 6 m in width.</p> <p>6. Comment on broader land use change from a conservation - agricultural - socio economic perspective is provided in ecological report. Notable that there is broad long term uncertainty, however consideration of existing PV facilities indicates that parks, under management can act to change or possibly improve habitat at a regional scale, depending upon one's approach to "habitat management".</p> <p>7. Cumulative impacts are reviewed where data and forecasting permits.</p>
<p>Point 4 - The proposed area does not fall within or close to an Important Bird Area (IBA), yet it does resort within a region of grids classified as being sensitive to Wind Farm facilities (refer to Figure 4). The darker the pendent the more sensitive the specific area is to Wind Farm facilities. Closer scrutiny regarding bird studies is thus a prerequisite due to possible impacts of birds on grid infrastructure as by implication local or regional migratory species that move around in response to surface water availability may be at risk from infrastructure collisions. It is also critical to point out that bird data for this area is based on the South African Bird Atlas Project 1 (SABAP1); data published in 1997 and recorded at a much broader scale than the SABAP2 data survey. Evidently, one can conclude that data for this area is outdated. This is specifically highlighted as a point of concern as each of the three PV projects will be separately linked to the Eskom grid through its own set of powerlines.</p> <p>Caption Figure 4: The three Solar PV facility (blue arrow) is proposed for an area classified as being sensitive to Wind Farm facilities. The darker the pendent the more sensitive the specific area is to Wind Farm facilities.</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation</li> </ul> <p>5 November 2015 (Letter via email)</p>	<p>1. Project is PV related and not wind power.</p> <p>2. Avifauna assessment identified impacts on birds and has made recommendations. Electric fencing, rather than overhead powerlines, is considered to be greatest risk to particular species of avifauna.</p>

COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<p>Though the proposed development is not a Wind Farm facility it poses significant risks to birds through collision with grid infrastructure as each of the three facilities will have its own transmission lines connecting to the Eskom Nieuwehoop grid station north east of the proposed development. A seven Solar PV facility (black arrow) is proposed north east of the proposed three Solar PV facility, each also having its own transmission line.</p>		
<p>Section B - Bird Monitoring:</p> <ul style="list-style-type: none"> <li>▪ Bird monitoring programmes should form part of the Environmental Management Programme. <ul style="list-style-type: none"> <li>○ Monitoring of birds over a full seasonal period (12 months) is supported.</li> <li>○ This will help to support a comparative lack of data on bird species in the study area from the SABAP database.</li> <li>○ The information will also provide data on bird flight paths, risk of collision in specific areas, habitat niches etc.</li> <li>○ An extensive monitoring area across the study area (i.e. non-resident species) is advised to comprehensively account for the movement of species.</li> </ul> </li> <li>▪ Appropriate bird deterrent devices must be placed around the facility to lessen the impact caused by collision of avifauna with the development infrastructure (Hernandez et al., 2014, Kagan et al., 2014). <ul style="list-style-type: none"> <li>○ All Power lines should be clearly marked with bird flappers / markers.</li> <li>○ Bird marker devices must be put on the earth wires (live wires) of the power line as appose to the conductors [Bird Flight Divertor (BFD) as oppose to other bird marker devices are suggested (Anderson, 2001)].</li> </ul> </li> <li>▪ Relevant Birdlife SA protocols should be consulted to conduct the EIA assessment for birds (Guide to Access Avian Data for Environmental Impact Assessment Reports, Retief et al. 2013; BirdLife South Africa / Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa, Jenkins et al. 2012). Although the Jenkins and others guideline refers</li> </ul>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation 5 November 2015 (Letter via email)</li> </ul>	<ol style="list-style-type: none"> <li>1. Avian monitoring assessment (post Environmental Authorisation) aligning with Birdlife SA guidelines is proposed.</li> <li>2. BFDs are included into recommendations for establishment of powerline. Use of specific non Delta type towers is recommended.</li> <li>3. Birdlife SA assessment methods are noted, however time resources do not allow for exact application of these protocols. It is also noted that the methods of assessment do align with general ecological principles for faunal assessment; however a broad range evaluation of species within the region as well as a site specific evaluation was undertaken to garner primary data. Such data was matched with secondary data from the literature.</li> <li>4. Water fowl populations considered to be minimal by avifaunal specialist</li> <li>5. IAPs noted.</li> </ol>

COMMENT	COMMENTATOR AND DATE	RESPONSE FROM SPECIALIST
<p>specifically to Wind farms, many of the principles apply for a thorough assessment. The electricity grid infrastructure especially remains a significant risk for bird collisions.</p> <ul style="list-style-type: none"> <li>▪ Potential impacts on water fowl such as flamingos, ducks and geese as well as large Terrestrial Birds such as bustards and korhaan as well as raptors must be investigated. Potential impacts must speak to the Renewable Energy technologies and infrastructure as well electricity grid infrastructure.</li> <li>▪ BirdLifeSA must be informed as I&amp;AP to provide comment on the development.</li> <li>▪ SKA must be consulted as I&amp;AP to provide comment on the development.</li> <li>▪ SAEON Arid Node must be informed as I&amp;AP to provide comment on the development.</li> </ul>		
<p>Section D: Environmental Management Programme:</p> <ul style="list-style-type: none"> <li>▪ Training and awareness on the illegal poaching and removal of succulents (e.g. Hoodia gordonii, Euphorbia spp.) and the protected quiver tree, Aloe dichotoma.</li> <li>▪ The EIA must address how risk of alien plan infestation by predominantly Prosopis will be addressed, since the region is known to be under threat from infestation.</li> <li>▪ A proper invasive alien management plan should be written into the EMP. The area should be kept clear of invasive alien species; active management is a prerequisite.</li> <li>▪ Bird deterrent devices to lessen the impact caused by collision of avifauna with development infrastructure.</li> <li>▪ Possible electrocution of small mammals should be taken into account if electric fences are considered as a security measure.</li> <li>▪ Free movement of small mammals if the development property is to be fenced.</li> </ul> <p>Rehabilitation plans must be provided as to how post construction rehabilitation will be approached as well as operational phase control measures for protecting equipment, for example cutting/scraping/ herbicide applications underneath solar panels.</p>	<ul style="list-style-type: none"> <li>• Elsabe Swart (Deputy Director - Research and Development Support) and Samantha De la Fontaine (District Ecologist), Northern Cape Department of Environment and Nature Conservation 5 November 2015 (Letter via email)</li> </ul>	<ol style="list-style-type: none"> <li>1. Assessment provides recommendations on removal of exotic weeds.</li> <li>2. Avifaunal deterrents are incorporated into EMP recommendations.</li> <li>3. Impact of electric fence addressed in EMP.</li> <li>4. Recommendations on faunal pathways into and out of fence proposed.</li> <li>5. Rehabilitation proposals provided in EMP.</li> </ol>

Additional comments raised during the 30-day review of the EIA Report (3 March 2016 to 5 April 2016) are included in Chapter 6 of the EIA Report.

## **7.5.2 Identification of Potential Impacts**

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### **7.5.2.1 Construction Phase**

The following potential impacts during the Construction Phase can be summarised:

- Alteration of habitat structure and composition;
- Ousting (and recruitment) of various fauna;
- Changes in the geomorphological state of drainage lines (i.e. changes to surface drainage patterns) due to construction activities leading to change in plant communities and general habitat structure, within the site and immediately adjacent to it;
- Increased electrical light pollution, leading to changes in nocturnal behavioural patterns of fauna;
- Exclusion or entrapment of (in particular) large fauna, on account of the fencing of the site;
- Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points;
- Changes in subsurface water resources;
- Changes in water resources and surface water in terms of water quality (i.e. impact on water chemistry) as a result of construction activities; and
- Exotic weed invasion.

### **7.5.2.2 Operational Phase:**

The following potential impacts during the Operational Phase can be summarised:

- Continued alteration of habitat structure and composition on account of continuing low level anthropogenic impacts, such as “shading of vegetation” from arrays;
- Ousting (and recruitment) of various fauna on account of long term changes in the surrounding habitat/environment;
- Changes in the geomorphological state of drainage lines on account of long term climatic changes and the concomitant change in the nature of the catchment on account of the land use change;
- Changes in water resources and water quality (i.e. impact on water chemistry) as a result of operational activities. Such changes will be related to the long term activities on site, but are likely to be negligible; and
- Exotic weed invasion as a consequence of regular and continued disturbance of site.

### **7.5.2.3 Decommissioning Phase**

Such alterations and changes will be dependent upon the expectant post-decommissioning land use. However, abandonment of the site would probably result in:

- A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise;
- A reversion of present faunal population states within the study area;
- Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment; and
- Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures.

#### 7.5.2.4 Cumulative Impacts

Cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

- Extensive alteration of habitat structure and composition over an extensive and wide area;
- Changes in fauna through exclusion of certain species and beneficiation of others over an extensive and wide area;
- Increased change in the geomorphological state of drainage lines on account of long term and extensive change in the nature of the catchment;
- The continued and cumulative loss of habitat at a landscape to regional level, with a particular impact on avi-faunal behaviour.
- Changes in water resources and surface water in terms of water quality (i.e. impact on water chemistry) on account of extensive changes in the catchment; and
- Exotic weed invasion as a consequence of regular and continued disturbance across an extensive area of site.

The cumulative impacts assessed in this specialist study consider certain developments that occur with a 20 km radius of the proposed project, as shown in Chapter 4 of the EIA Report.

## 7.6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

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The proposed development of the PV facility on the study site indicates that the land use change should arise to the east and north of the site, avoiding drainage features evident to the west. A number of potential impacts have been identified in Section 7.5.1. These potential negative impacts are given further consideration below, with possible mitigation measures being proposed.

### Construction Phase

#### 7.6.1 *The ousting of fauna and loss of vegetation/habitat through anthropogenic activities, disturbance of refugia and general change in habitat with concomitant ecological repercussions*

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During the construction phase, a high level of disturbance is likely to arise over a period of 9 - 14 months. Such disturbance will relate to excavation, noise and general anthropogenic influences associated with the building of the facility on site. This may include the cutting and removal of vegetation for the establishment of internal gravel roads (a permanent transformation) and the cutting and trampling of vegetation wherever the arrays may be established. Direct, indirect and cumulative impacts expected to arise on site are identified below:

#### Direct Impacts

- Loss of “*less resilient*” plant species and replacement with more *robust* species leading to a change in habitat form and structure.
- Introduction of exotic vegetation or the invasion of disturbed areas by exotic vegetation through either a physical vector (e.g. machinery, vehicles etc.) or more “natural” dispersion vectors (e.g. wind, avian dispersion).
- Ousting of fauna through disturbance and human presence. As such, the loss of fossorial and other species will alter the ecological processes inherent within the site (e.g. change in disturbance thresholds, herbivory etc.).



- Opportunistic animal species may benefit from the construction activities; in particular the exclusion of predators from the site may benefit former prey species which will take refuge within the area, skewing populations and predator - prey relations.

#### Indirect Impacts

- Changes in habitat form and structure may extend beyond the site boundaries as species prevalence changes within the PV site. This change will skew plant competition in areas around the site as propagule levels change and species competition in the immediate vicinity of the site alters.
- As indicated in the direct impacts, faunal populations may be favoured by the establishment of the facility and as such these changes will be evidenced beyond the boundaries of the PV facility.

#### Cumulative Impacts

- Presently the study site and surrounds are subject to limited anthropogenic impacts with the exception of the electrical infrastructure, railway and roads, fences and livestock management operations. It is expected that sites to the north and north east of the subject site will be developed for similar PV facilities including the Nieuwehoop (Phase 1 and Phase 2) PV projects that are located further east of the site. Should these sites be developed prior to the development of the Kenhardt PV 1 project, it is envisaged that:
  - Exotic species invasion may arise from adjacent projects (if not controlled on site), particularly as a consequence of the prevailing northerly winds; and
  - Fauna ousted from these sites may, in part relocate towards the subject site, and in turn be ousted towards the south and west of the site. Although lands to the south and west are similar in nature and form to the subject site, this marks a minor but nevertheless evident consequence of the cumulative impact of such facilities on fauna within the region.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent; the indirect impact is rated with a local spatial extent, and the cumulative impact is rated with a local to regional spatial extent. The impacts are rated with a long-term duration (i.e. the impact and risk will occur for the project duration). The consequence and probability of both the direct and cumulative impacts are respectively rated as substantial and very likely. The consequence and probability of the indirect impact are respectively rated as substantial and likely. The reversibility of the direct impact is rated as low and the irreplaceability is rated as low. The reversibility of both the indirect and cumulative impact is rated as moderate and the irreplaceability is rated as low.

#### Significance of Impact without Mitigation

Moderate

#### Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. A second assessment of the site should be undertaken in or around February to March (subsequent to the issuing of an Environmental Authorisation and the completion of the detailed engineering) in order to identify any additional plant specimens of significance that may be evident on site. Such specimens may be relocated/removed (i.e. search and rescue) or avoided (with the relevant permits and approvals in place) prior to the commencement of construction.
2. The detailed design of the laydown footprint of the arrays should take consideration of the minor drainage lines present on site and any additional significant plant species that may be identified prior to the commencement of construction. Other features of the site should be incorporated into the PV array design.
3. An initial pre-construction clearance of all exotic vegetation on site should be undertaken to reduce the possibility of further exotic weed invasion. Continued exotic

weed control measures should be implemented during the construction phase and may be incorporated into an exotic weed control plan for the site.

4. The ousting of larger game from fenced areas should be undertaken through a general sweep of the laydown area once the fence is erected.
5. The maintenance of vegetation and avoidance of the “blading” or clearance of vegetation by machinery. Vegetation is generally of such low level that blanket clearance is unnecessary.
6. Consideration of the siting and layout of the temporary construction site and worker camp.

**Significance of the impact with mitigation** **Low**

### ***7.6.2 Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure within the site and immediately adjacent to it***

Significant drainage features on site will be avoided in the laydown of the proposed PV facility. It is however, evident that some surface flow change will arise on account of excavation, plant and human movement and the placement of structures. Direct, indirect and cumulative surface hydrological impacts expected to arise on site are identified below:

#### **Direct Impacts**

- Minor variation in the flow regimen within smaller drainage features, but possibly compounded within larger features.
- Increased sediment discharge into surface drainage features as a consequence of disturbance to soils and moderate to heavy rainfall. This may alter habitat for certain species that are related to the drainage lines.

#### **Indirect Impacts**

- Shifts in habitat form and structure as plant - water relations change across portions of the site.

#### **Cumulative Impacts**

- Sustained changes in the upper drainage pattern and watershed will see minimal changes in the major drainage lines. This will be compounded further downstream in the Wolfkopseloop system, particularly if other, similar developments within the same catchment arise. Changes may be manifest in the increased rate of flow within the system with consequences in terms of bed and bank morphology.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct impact is rated with a site specific spatial extent; the indirect impact is rated with a local spatial extent, and the cumulative impact is rated with a regional spatial extent. The direct, indirect and cumulative impacts are respectively rated with a medium-term, short-term and long-term duration. The consequence and probability of both the direct and indirect impacts are respectively rated as moderate and likely. The consequence and probability of the cumulative impact are respectively rated as substantial and likely. The reversibility of the direct and indirect impact is rated as high, whilst the cumulative impact is rated with a low reversibility. The irreplaceability of the direct and indirect impact is rated as low, whilst the cumulative impact is rated with a moderate irreplaceability.

**Significance of Impact without Mitigation (Direct and Indirect Impacts):** **Low**

**Significance of Impact without Mitigation (Cumulative Impacts):** **Moderate**

## Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Exclusion of major drainage lines from the development footprint.
2. Avoidance of significant sculpting of land and maintenance of the general topography of the site.
3. Placement of energy dissipaters (such as stone levees or similar structures) within minor drainage lines to reduce velocity of flow through such features.
4. Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible).
5. Maintenance of a high level of housekeeping on site during the construction phase.
6. Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.

**Significance of Impact with Mitigation (Direct and Indirect Impacts):** Very Low

**Significance of the impact with mitigation (Cumulative Impact):** Low

### *7.6.3 Alteration of surface water quality on account of construction activities that lead to change in water chemistry*

Allied to the above, the construction phase will result in changes in water chemistry that will relate to:

#### Direct Impacts

- The physical alteration of surface run off (sediments, turbidity etc.).
- A change in dissolved substances within surface waters on account of excavation of onsite soils and import of soils and hardpan materials to site.
- A change in dissolved substances within the surface waters due to spillage of hydrocarbons and disposal of other liquids and foreign materials on site.
- Solid wastes, in particular plastics and paper, arising from site are likely to arise within drainage systems.

#### Indirect Impacts

- Water quality in the lower reaches of the Wolfskopseloop system and possibly in the Hartebees River may be subject to minor alteration in water chemistry, dependent upon rainfall in the catchment.

#### Cumulative

- The run off from all PV facilities, whether developed in tandem or subsequent to one another, will see small changes in water chemistry associated with run off from these sites.
- Changes in water chemistry will be more evident in the permanent water bodies, downstream of the sites; however dilution factors will make these particular impacts negligible.

The status of this impact is rated as negative and direct, indirect and cumulative in nature. The direct and indirect impacts are rated with a local spatial extent; whilst the cumulative impact is rated with a regional spatial extent. The direct and indirect impacts are rated with a short-term duration, and the cumulative impact is rated with a long-term duration. The consequence and probability of both the direct and indirect impacts are respectively rated as slight and likely. The consequence and probability of the cumulative impact are respectively rated as moderate and likely. The reversibility and irreplaceability of both the direct and indirect impacts are respectively rated as high and low. The reversibility and irreplaceability of the cumulative impact are rated as

moderate. The irreplaceability of the direct and indirect impact is rated as low, whilst the cumulative impact is rated with a moderate irreplaceability.

**Significance of Impact without Mitigation (Direct and Indirect Impacts): Very Low**

**Significance of Impact without Mitigation (Cumulative Impact): Moderate**

**Mitigation:**

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Undertaking and completion of earthworks and road construction outside of the high rainfall period in January to March (if possible and practical).
2. Maintenance of a high level of housekeeping on site during construction, including management and maintenance of vehicles, storage of dangerous goods including bulk liquids and disposal of wastes.
3. Inspection of drainage features immediately outside of the footprint of proposed PV facility and undertake removal of solid waste materials (if identified) on a regular basis. Exclusion of major drainage lines from the development footprint.
4. Avoidance of significance sculpting of land and maintenance of the general topography of the site.
5. Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features.

**Significance of Impact with Mitigation (Direct and Indirect Impacts): Very Low**

**Significance of the impact with mitigation (Cumulative Impact): Low**

***7.6.4 Depending upon the origin of water (import or through abstraction of groundwater), changes in subsurface water resources may arise, particularly in the case of the latter***

The construction of the proposed PV facility will require significant volumes of water, particularly for the construction of roadways. If local boreholes are utilised for the provision of such water, these resources may be placed under pressure, while the import of water to the site may alter the recharge of water to subsurface resources. It is important to note that the impact of the proposed project on groundwater and the geohydrology is assessed as part of a separate specialist study (i.e. Chapter 11 of the EIA Report).

**Direct Impacts**

- Abstraction from site is unlikely as the aquifer is considered to be low to moderate in yield at a preliminary level of consideration. However, increased demand on these aquifers will serve to reduce water availability, if such aquifers are located close to the surface. Such draw down of the aquifer may alter the plant water relations of larger specimens that rely on such resource e.g. *A erioloba*.
- The introduction of water to site by import may alter the availability of water to plants within the site and may lead to changes in habitat form and structure around areas that receive such import.

**Indirect Impacts**

- Abstraction of water from subsurface resources may have consequences for areas beyond the site perimeter, depending on the extent of the aquifer under consideration. Depletion of the aquifer may affect habitat forms at lower points within the catchment.

### Cumulative Impacts

- Continued and sporadic abstraction of water by a number of users from the same aquifer may affect water resources downstream of the site, as well as the availability of water to other sites.

The status of this impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as substantial and likely. The reversibility and irreplaceability of the impact are both rated as moderate.

**Significance of Impact without Mitigation**

**Moderate**

### Mitigation

Proposed mitigation measures that may alleviate the significance of the above impacts include:

- Identification of suitable water resources, preferably off site and not utilized by other PV facilities. Confirmation of yield will be required prior to abstraction.
- Use of recycled water for construction purposes from identified resources e.g. sewerage facilities or similar facility.
- Identify or consider alternative cleaning methods for the PV panels.

**Significance of the impact with mitigation**

**Low**

### ***7.6.5 Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points***

The construction phase will include the import of soils from other sites, as well as the compaction of soils. The related direct, indirect and cumulative impacts are identified below.

#### Direct Impacts

- Depending upon the nature of soils (particle size, clay and mineral content etc.) changes in habitat form may arise at a very localized level as plant species that are tolerant of or prefer particular soils benefit at the expense of other species which are less tolerant.
- Compaction of soils by traffic and through the use of compactors, will allow for some plant species to competitively benefit over other species.

#### Indirect Impacts

None identified, unless soils are disturbed outside of the development footprint

#### Cumulative Impacts

- In a sandy environment, such as the Bushmanland Arid Grassland, differing soil forms will see some plant species benefit at the expense of others. With a number of similar projects underway within close proximity of each other, associations of particular species may become more prevalent on site, in clustered areas within the development sites.

The status of the direct impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

The status of the indirect impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence

and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as low.

**Significance of Impact without Mitigation (Direct and Cumulative Impacts):** Low

**Significance of Impact without Mitigation (Indirect Impact):** Very Low

#### **Mitigation**

Proposed mitigation measures that may alleviate the significance of the above impacts include:

1. Ripping of compact soils when and where extensive compaction arises.

**Significance of the impact with mitigation (Indirect and Cumulative Impacts):** Very Low

**Significance of Impact with Mitigation (Direct Impact):** Low

### ***7.6.6 Increased Electrical Light Pollution (ELP), leading to changes in nocturnal behavioural patterns amongst fauna***

As indicated above, operations at the site during the construction phase will require the placement of security lighting as well as the undertaking of operations at dusk and before dawn. Lighting will be required at points around the site.

#### **Direct Impacts**

- Increased lighting around the laydown area and possibly across the site will change faunal behavior. Nocturnal and crepuscular species may either benefit or be suppressed as a consequence of such lighting. For example, Chiropterans (bats) may be encouraged or attracted to site as a consequence of increased prey items being present in and around lighting, or certain species, such as night jar, may become more vulnerable to predation as a consequence of lighting.

#### **Indirect Impacts**

- As a consequence of lighting at the site, species may be drawn from other areas or alternatively ousted from points proximal to the site as a consequence of changes in behavior of one or more species, affected by ELP.

#### **Cumulative Impacts**

- With a number of PV projects being clustered in the area, it is envisaged that the ELP and the presence of a wider landscape based light imprint or “aura” may become a significant component of the regional environment. This may serve to change faunal behavior over a wide portion of the area in question.

The status of the direct impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

The status of the indirect impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as very low.

**Significance of impact without mitigation (Direct Impact):** Low

**Significance of impact without mitigation (Indirect and Cumulative Impacts):** Very Low

#### **Mitigation**

1. Lighting and its placement and use on site should be given consideration, whereby ELP is minimized. This may entail managing the position of lights, their direction and luminescence. The project should strive to minimise ambient situational light emissions.

**Significance of impact with mitigation (Direct, Indirect and Cumulative Impacts):** Very Low

### **7.6.7 Exclusion or entrapment of (in particular) large fauna on account of the fencing of the site**

The placement of a fence around the site is one of the preliminary tasks affecting the site. Such fence serves to entrap some species within the laydown area, while other specimens can “escape”, (Figure 7.11) others still are enticed into the fenced area. This has some minor impacts, which are identified below.



**Figure 7.11: Fossorial movement under fences by larger animals, porcupines and Aardvark (*Orycteropus afer*).**

### Direct Impacts

- Fossorial species, such as aardvark (*O afer*), can disrupt activities through their foraging activities. This is particularly evident around fences.
- The exclusion of some fauna serves to alter habitat state as the fossorial behavior of some fauna is an ecological process requirement (e.g. excavation of soils by some animals allows for the settlement and germination of seeds, while termites etc. are controlled by species such as *O afer*).

### Indirect Impacts

- The ousting of certain fauna from the site requires that such specimens forage within other areas, resulting in various behavioural changes (e.g. territorial overlaps etc.).

### Cumulative Impacts

- As a large and contiguous area will eventually fall under a similar land use, with exclusion areas for larger fauna, inter-specific and intra-specific competition may increase within the local area.

The status of the direct impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

The status of the indirect impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as very low.

**Significance of impact without Mitigation (Direct, Indirect and Cumulative):** **Very Low**

### Mitigation

1. Ensure that the live electrical fence wire is not placed at ground level.
2. Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence (i.e. tortoise).

**Significance of impact with Mitigation (Direct, Indirect and Cumulative):** **Very Low**



## **Operations**

### ***7.6.8 Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the proposed PV facility i.e. larger fossorial species and predators will be excluded from the PV facility site by virtue of its fencing, generally leading to possible variations in populations of other species that remain within the site, with concomitant ecological change***

As per the construction phase impacts, impacts arising from the cordoning of the site from faunal intrusion may see changes in the general ecological state of vegetation structure and form on site. Potential direct, indirect and cumulative impacts are described below:

#### **Direct Impacts**

- Changes in plant community structure as drivers of certain species are excluded from the subject area, for example herbivory is curtailed on certain plant species.
- Introduction of exotic vegetation where moribund vegetation arises as a consequence of changes in local ecological drivers.
- Opportunistic animal species may benefit from the exclusion of other species, such as prey species. This may lead to a skewing of populations within the site.

#### **Indirect Impacts**

- Changes in habitat form and structure may extend beyond the site boundaries as species prevalence changes within the proposed PV site. This change will skew plant competition in areas around the site as propagule levels change and species competition in the immediate vicinity of the site alters.
- Faunal populations may be favoured by the establishment of the facility and as such these changes will be evidenced beyond the boundaries of the PV facility.

#### **Cumulative Impacts**

- Should the additional expected PV facilities be established, together with the subject site, it is evident that a significant portion of land will be subject to the exclusion of certain fauna, with the concomitant cumulative effects identified above being more spatially extensive in nature.

The status of the direct impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

The status of the indirect impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low. The significance of the indirect impact without mitigation is rated as moderate.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as substantial and very likely. The reversibility and irreplaceability of the impact are both rated as low. The significance of the cumulative impact without mitigation is rated as moderate.

**Significance of impact without mitigation (Direct Impact) Low**

**Significance of Impact without Mitigation (Indirect and Cumulative Impact) Moderate**

#### **Mitigation**

1. Provision of critter paths within the fencing should be considered in the design. Similar fencing has been instituted in Dreuunberg PV facility. Its use relates primarily to the movement of small mammals (suricates and ground squirrel) as well as the Giant African bullfrog (*Pyxicephalus adspersus*). These species have been noted to utilise the critter paths (Figure 7.11), however burrowing and other activities continue in respect of larger fauna, regardless of such mechanisms.
2. Promote and support faunal presence and activities within the proposed PV facility, where applicable. For example, the maintenance of suricate warrens and possibly low, endoreic pans, where they may arise.

**Significance of impact with Mitigation (Direct, Indirect and Cumulative) Low**

#### **7.6.9 Increased shading, as a consequence of the PV arrays, will lead to changes in plant-water relations and possible changes in plant community structures within the site**

The arrangement of the arrays across site will result in increased shading of large tracts of land and as a consequence the present loss of water from the affected soils will change, altering plant-water relations. In addition, the exclusion of both livestock and other herbivores may result in medium to long term changes in habitat form and structure. The following impacts are forecast:

##### **Direct Impacts**

- Minor changes in habitat composition as certain species are ousted and others favoured as a consequence of the change in improved plant-water relations.
- Increased verdant growth in some species lying below the arrays.
- Reduced herbivory may give rise to changes in plant composition and structure on site.

##### **Indirect Impacts**

- With herbivory reduced and improved plant-water relations within large areas of the park, the area may act as a natural propagule repository for certain plant species, particularly those normally subject to grazing by livestock.

##### **Cumulative Impacts**

- As a number of PV projects will span a significant portion of contiguous land, and if all impacts are similar across these sites, then it may be expected that the above changes in habitat will encompass a significant portion of the surrounding environment.
- A large scale seed repository, free from intensive grazing pressures will be established within the region.

The status of the direct impact is rated as neutral with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

The status of the indirect impact is rated as negative with a local spatial extent and short-term duration (i.e. the impact and risk will be experienced for less than 1 year). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and

irreplaceability of the impact are respectively rated as high and low. The significance of the indirect impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a site specific spatial extent and medium-term duration (i.e. the impact and risk will be experienced for 1-10 years). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as low.

**Significance of impact without mitigation (Direct and Indirect Impacts): Very Low**

**Significance of impact without mitigation (Cumulative Impact): Low**

**Mitigation**

1. None identified.

**Significance of impact with mitigation: Not applicable**

***7.6.10 Changes in meteorological factors at a local scale, on account of the proposed PV array are likely to arise (e.g. subtle changes in wind dynamics, “heat bubble phenomenon” as well as the alteration in run off of surface water and evapotranspiration states), leading to long term, but generally latent changes in habitat***

The potential direct impact is rated below.

**Direct Impacts:**

- The abovementioned “heat bubble” may alter behavioural patterns in some avian species, particularly raptors and larger species that utilize thermals. The consequence of such changes are however unknown.

**Indirect Impacts:**

- None identified

**Cumulative Impacts:**

- None identified

The status of the direct impact is rated as neutral with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

**Significance of impact without mitigation Very Low**

**Mitigation measures**

- None identified.

**Significance of impact with mitigation Not Applicable**

### 7.6.11 Potential abstraction of groundwater for the cleaning of modules, as well as operational use, will alter the state of subsurface water resources, depending upon nature and origin of such water

It is doubtful if the requisite amount of water required for the cleaning of the PV panels is available on site; however the following impacts are forecast. As mentioned above, the impact of the proposed project on groundwater and the geohydrology is assessed as part of a separate specialist study (i.e. Chapter 11 of the EIA Report).

#### Direct Impacts

- Increased demand on local aquifers will serve to reduce water availability, if such aquifers are located close to the surface. Such draw down of the aquifer may alter the plant-water relations of larger specimens that rely on such resource e.g. *A erioloba*.

#### Indirect Impacts

- Abstraction of water from subsurface resources at the rate required may have consequences for areas beyond the site perimeter, depending upon the extent of the aquifer under consideration. Depletion of the aquifer may affect habitat forms at lower points within the catchment.

#### Cumulative Impacts

- As a number of PV facilities will be in operation in and around the identified aquifers, continued and regular abstraction of water by a number of users from the same aquifer(s) may affect water resources downstream of site, as well as the availability of water to other sites.

The status of the direct impact is rated as negative with a local spatial extent and very short-term duration (i.e. the impact and risk will be instantaneous). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are both rated as moderate. The significance of the direct impact without mitigation is rated as very low.

The status of the indirect impact is rated as negative with a local spatial extent and short-term duration (i.e. the impact and risk will be experienced for less than 1 year). The consequence and probability of the impact are respectively rated as substantial and likely. The reversibility and irreplaceability of the impact are both rated as moderate. The significance of the indirect impact without mitigation is rated as moderate.

The status of the cumulative impact is rated as negative with a regional spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as severe and likely. The reversibility and irreplaceability of the impact are respectively rated as moderate and low. The significance of the cumulative impact without mitigation is rated as high.

Significance of impact without mitigation (Direct and Indirect Impacts): Moderate

Significance of impact without mitigation (Cumulative Impact): High

#### Mitigation

- Preferential use of recycled water arising from sewerage treatment facilities for operational phase requirements (instead of groundwater) where this may be available.
- The prudent use of surface water resources where management and monitoring are more achievable than subsurface resources.
- Adopt “dry” cleaning methods, such as dusting and sweeping the site before washing down.

4. Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol on site.
5. Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers i.e. cleaning is undertaken throughout the year rather than at singular intervals at select times of the year.

**Significance of impact with mitigation (Direct and Indirect Impacts):** **Low**

**Significance of impact with mitigation (Cumulative Impact):** **Moderate**

### ***7.6.12 Overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behavior in and around the site***

#### **Direct Impacts**

- Overhead lines, fences and other infrastructure will alter the foraging behavior of species, in particular raptors. An increase in perching opportunities will allow for improved predation amongst birds of prey. In addition, species such as jackal, may utilize fences in order to accost and entrap prey.

#### **Indirect Impacts**

- None identified

#### **Cumulative Impacts**

- As a large area of land will be affected by multiple PV facilities, it is evident that any behavioural changes, as described above, will be compounded by the extent of the facilities in the area.

The status of the direct impact is rated as negative with a local spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and unlikely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as very low.

The status of the cumulative impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as slight and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the cumulative impact without mitigation is rated as very low.

**Significance of impact without mitigation** **Very Low**

**Mitigation:** None identified

**Significance of impact with mitigation** **Not Applicable**

**7.6.13** *The fencing of the site, possibly with electric fencing, is likely to impact upon faunal behaviour, leading to the exclusion of certain species and possible mortalities. Alternatively such changes may also favour some specific individuals, particularly those that remain within the confines of the PV facility, which is likely to lead to further localised alteration of habitat and ecological process within the proposed PV facility*



Figure 7.12: Night Jar (*Caprimulgus rufigena*) electrocuted on energised electric fence.

**Direct Impacts:**

- As indicated above, the introduction of infrastructure into the area will change faunal behaviour. Electric fencing, the preferred method of securing PV facilities can have significant negative consequences for in particular, tortoise, small passerine birds and reptiles such as snakes. These species, if coming into contact with the charged wires of the fence can be severely maimed or killed. Tortoise, if moving up to an electric fence are unable to move away from the fence if they are unable to extend their head and neck. As such tortoise are susceptible to immobility and death through starvation if encountering an electric fence with a positive wire in or around ground level.

**Indirect Impacts:**

- None identified

**Cumulative Impacts:**

- As a large area of land will be affected by multiple PV facilities, it is evident that any mortalities and injury associated with electrocution from fencing may be compounded.

The status of the direct impact is rated as negative with a site specific spatial extent and long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the direct impact without mitigation is rated as low.

**Significance of impact without mitigation** **Low**

**Mitigation**

1. Ensure that the live electrical fence wire is not placed at ground level.
2. Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the electric fence (i.e. tortoise).

**Significance of impact with mitigation** **Very Low**

**Decommissioning Phase**

The decommissioning phase is expected to see a reversion to an agricultural land use akin to the present state or alternatively some other agricultural activities. As such the structures on site will be removed, in particular the PV arrays.

***7.6.14 A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise***

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During the decommissioning phase, the potential impact of reverting to the present seral stage has been identified.

The spatial extent of this impact is site specific with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are both rated as low. The significance of the impact without mitigation is rated as low.

**Significance of impact without mitigation** **Low**

No mitigation measures have been identified.

***7.6.15 A reversion of present faunal population states within the study area***

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With the removal of infrastructure from site, areas of exclusion as well as anthropogenic influences on population states and presence within the site will alter accordingly. Such alteration will see species excluded from the area under a PV facility (larger mammals in particular), access areas from which they were previously excluded. Habitat change on site will influence population trends and traits within the area.

The spatial extent of this impact is site specific with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the impact without mitigation is rated as low.

**Significance without mitigation** **Low**

No mitigation measures have been identified

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### ***7.6.16 Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment***

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As infrastructure is removed from site, surface hydraulics will change in site. Habitat changes associated with the reversion to an agricultural land use will see concomitant changes in the geomorphological state of both major and minor drainage lines, resulting from an equilibria shift.

The spatial extent of this impact is local with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the impact without mitigation is rated as low.

**Significance of impact without mitigation** **Low**

No mitigation measures have been identified

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### ***7.6.17 Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures***

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Exotic weed invasion is a likely consequence the cessation of the PV facility operations. Decommissioning of site will see increased disturbance of the land and therefore increased susceptibility to exotic weed invasion.

The spatial extent of this impact is local-regional with a long-term duration (i.e. the impact and risk will be experienced for the project duration). The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility and irreplaceability of the impact are respectively rated as high and low. The significance of the impact without mitigation is rated as medium.

**Significance without mitigation** **Moderate**

Mitigation would include monitoring of the land and redress of exotic weeds found present on site. In addition, the stabilisation of disturbed lands immediately after the clearance of the land of the PV arrays and related infrastructure would serve to moderate the potential for invasion.

**Significance with mitigation** **Low**



## 7.7 IMPACT ASSESSMENT SUMMARY

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**Table 7.4: Direct impacts assessment summary table for the Construction Phase**

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Proba- bility	Rever- sibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The ousting of fauna through anthropogeni c activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	Detailed design and incorporation of habitat and features  Plant rescue operations  Exotic weed control  Game sweep of site  The maintenance of vegetation and avoidance of the “blading” or clearance.  Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Proba- bility	Rever- sibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Habitat change through changes in topographic drivers	Negative	Site	Medium-Term	Moderate	Likely	High	Low	<p>Avoidance of major drainage features during construction</p> <p>Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible).</p> <p>Avoidance of significant sculpting of land and maintenance of the general topography of the site</p> <p>Maintenance of a high level of housekeeping on site during the construction phase.</p> <p>Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertake removal of solid waste and litter on a regular basis.</p>	Low	Very low	5	High

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Proba- bility	Rever- sibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Abstraction from subsurface aquifers may have a significant impact on plant water relations.	Water volume and ecological change	Negative	Local	Long term	Moderate	Likely	High	Low	Alternative water resources to be utilized.	Very low	Very Low	5	Medium
The introduction of water to site by import may alter the availability of water to plants within the site and may lead to changes in habitat form and structure around areas that receive such import.	Change in plant water relations	indeterminate	Local	Long term	Slight	Likely	High	Low	None identified	Very Low	Very Low	5	High

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Proba- bility	Rever- sibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Alteration of surface water quality that lead to change in water chemistry	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	Avoidance of significant sculpting of land and maintenance of the general topography of site.  Placement of energy dissipaters within minor drainage lines to reduce velocity of flow through such features.	Very low	Very low	5	Medium
Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points.	Habitat change and alteration in fauna and faunal behaviour	Negative	Site	Long term	Moderate	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises.	Low	Low	4	Medium
Increased ELP, leading to changes in nocturnal behavioural patterns amongst fauna	Changes in faunal behaviour	Negative	Local	Long term	Moderate	Very likely	High	Low	Reduce level of lighting and placement of lighting to be judiciously considered at time of implementation.	Low	Very low	5	High

Construction Phase													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Proba- bility	Rever- sibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site.	Animal mortalities	Negative	Site	Long term	Slight	Very likely	High	Low	Ensure that the live electrical fence wire is not placed at ground level.  Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence.	Very low	Very low	5	High

**Table 7.5: Indirect impact assessment summary table for the Construction Phase**

Construction Phase													
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)		
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Local	Long-Term	Substantial	Likely	Moderate	Low	Detailed design and incorporation of habitat and features  Plant rescue operations  Exotic weed control  Game sweep of site  The maintenance of vegetation and avoidance of “blading” or clearance.  Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High

Construction Phase													
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)		
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Habitat change through changes in topographic drivers	Negative	Local	Short term	Moderate	Likely	High	Low	<p>Undertaking and completion of earthworks and road construction outside of the high rainfall period (if possible).</p> <p>Avoidance of significance sculpting of land and maintenance of the general topography of the site.</p> <p>Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features.</p> <p>Maintenance of a high level of housekeeping on site during the construction phase.</p> <p>Inspection of drainage features immediately outside of the footprint of the proposed PV facility and undertake removal of solid waste and litter on a regular basis.</p>	Low	Very low	5	High



Construction Phase													
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)		
Alteration of surface water quality that lead to change in water chemistry	Water quality change and general pollution of resource	Negative	Local	Short term	Slight	Likely	High	Low	<p>Exclusion of major drainage lines from the development footprint.</p> <p>Avoidance of significant sculpting of land and maintenance of the general topography of site.</p> <p>Placement of energy dissipaters within minor drainage lines to reduce velocity of flow through such features.</p> <p>Maintenance of a high level of housekeeping on site during the construction phase.</p> <p>Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.</p>	Very low	Very low	5	Medium

Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

Construction Phase													
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)		
Changes in edaphics (soils) on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species in and around these points.	Habitat change and alteration in fauna and faunal behaviour	Negative	Local	Long term	Slight	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Very low	Very low	5	Medium
Increased ELP, leading to changes in nocturnal behavioural patterns amongst fauna	Changes in faunal behaviour	Negative	Local	Long term	Slight	Likely	High	Low	Provision of critter paths within fencing should be considered in the design. Promote and support faunal presence and activities within the proposed PV facility, where applicable.	Very low	Very low	5	High
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site.	Animal mortalities	Negative	Local	Long term	Slight	Likely	High	Low	Ensure that live electrical fence wire is not placed at ground level. Conduct regular (daily) inspections of the fence line to address any animals that may be affected by the fence	Very low	Very low	5	High

**Table 7.6: Direct Impact assessment summary table for the Operational Phase**

Operational Phase													
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)		
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the PV facility	Habitat and species loss	Negative	Site	Long-Term	Moderate	Very likely	High	Low	Provision of critter paths within the fencing should be considered in the design.  Promote and support faunal presence and activities within the proposed PV facility	Low	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Habitat change and species loss	Neutral	Site	Long-Term	Slight	Likely	High	Low	None identified	Very low	Not Applicable	5	High
Changes in meteorological factors at a local scale, on account of the PV array are likely to arise	Uncertainty in relation to change	Neutral	Site	Long-Term	Slight	Likely	High	Low	None identified	Very Low	Not Applicable	5	High

Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

Operational Phase													
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)		
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources	Water quantity changes with possible impact on habitat	Negative	Local	Very short term	Substantial	Likely	Moderate	Moderate	<p>Preferential use of recycled water sources for operational phase requirements (instead of groundwater).</p> <p>The prudent use of surface water resources.</p> <p>Adopt “dry” cleaning methods, such as dusting and sweeping the site before washing down.</p> <p>Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol.</p> <p>Low level and ongoing cleaning of PV panels over time to reduce demand on aquifers.</p>	Moderate	Low	4	High
Overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behaviour	Change in animal behaviour	Negative	Local	Long term	Slight	Unlikely	High	Low	None identified	Very low	Not applicable	5	Medium

Operational Phase													
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)		
The fencing of the site, possibly with electric fencing, is likely to impact on faunal behaviour, leading to the exclusion of certain species and possible mortalities	Animal mortality	Negative	Site	Long term	Moderate	Likely	High	Low	<p>Ensure that the live electrical fence wire is not placed at ground level.</p> <p>Conduct regular (daily) inspections of the fence line to address any animals that may be affected by electric the fence.</p>	Low	Very low	5	High

**Table 7.7: Indirect Impacts for the Operational Phase**

Operational Phase													
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)		
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the PV facility	Habitat and species loss	Negative	Site	Long-Term	Substantial	Very likely	Low	Low	Provision of critter paths within the fencing should be considered in the design.  Promote and support faunal presence and activities within the proposed PV facility	Moderate	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Habitat change and species loss	Negative	Local	Short term	Slight	Likely	High	Low	None identified	Very low	Not Applicable	5	High

Operational Phase													
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)		
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources	Water quality change and general pollution of resource	Negative	Local	Short term	Substantial	Likely	Moderate	Moderate	<p>Preferential use of recycled water sources for operational phase requirements (instead of groundwater).</p> <p>The prudent use of surface water resources.</p> <p>Adopt “dry” cleaning methods, such as dusting and sweeping of the site before washing down.</p> <p>Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol.</p> <p>Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers.</p>	Moderate	Low	4	High

**Table 7.8: Cumulative Impact assessment summary table for the Construction Phase**

Construction Phase													
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)		
The ousting of fauna through anthropogenic activities, disturbance of refugia and general change in habitat	Habitat and species loss	Negative	Local to Regional	Long-Term	Substantial	Very likely	Moderate	Low	Detailed design and incorporation of habitat and features  Plant rescue operations  Exotic weed control  Game sweep of site  The maintenance of vegetation and avoidance of the “blading” or clearance.  Consideration of the siting and layout of the temporary construction site and worker camp.	Moderate	Low	4	High
Alteration of surface drainage patterns on account of construction activities leading to change in plant communities and general habitat structure	Change in drainage patterns and drainage features	Negative	Regional	Long-Term	Substantial	Likely	Low	Moderate	Exclusion of major drainage lines from development  Avoid sculpting of land  Surface flow energy dissipaters  Maintenance of a high level of housekeeping on site during the construction phase.	Moderate	Low	4	High



Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

Construction Phase													
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)		
									Inspection of drainage features immediately outside of the footprint of the proposed PV facility and removal of litter and solid waste on a regular basis.				
Alteration of surface water quality that leads to change in water chemistry	Changes in drainage patterns and water quality	Negative	Regional	Long term	Moderate	Likely	Moderate	Moderate	<p>Avoid construction during the rainy season (if possible and practical).</p> <p>Avoidance of significance sculpting of land and maintenance of the general topography of the site including the avoidance of major drainage lines.</p> <p>Placement of energy dissipaters (such as stone levees or similar) within minor drainage lines to reduce velocity of flow through such features</p> <p>Apply good site management and solid waste management outside of site (within the immediate vicinity)</p>	Low	Low	4	Medium

Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

Construction Phase													
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)		
Changes in sub surface water resources may arise	Effects upon groundwater resources	Negative	Regional	Long term	Substantial	Likely	Moderate	Moderate	Identify off site water resources Use of recycled water Identify or consider alternative cleaning methods for the PV panels	Moderate	Low	4	Medium
Changes in edaphics on account of excavation and import of soils, leading to the alteration of plant communities and fossorial species	Habitat alteration	Negative	Regional	Long term	Moderate	Likely	High	Low	Ripping of compact soils when and where extensive compaction arises	Low	Very low	5	Medium
Increased ELP	Faunal behavioural change	Negative	Regional	Long term	Slight	Likely	High	Low	Review the placement of lighting on the site.	Very low	Very low	5	Medium
Exclusion or entrapment of in particular large fauna, on account of the fencing of the site	Animal mortality	Negative	Regional	Long term	Slight	Likely	High	Low	Placement of live wires Monitoring of fence line	Very low	Very low	5	Medium

**Table 7.9: Cumulative Impact assessment summary table for the Operational Phase**

Operational Phase													
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)		
Alteration of ecological processes on account of the exclusion of certain fauna, inherent to the functional state of the land within the proposed PV facility	Habitat and species loss	Negative	Regional	Long-Term	Substantial	Very likely	Low	Low	Provision of critter paths within the fencing should be considered in the design.  Promote and support faunal presence and activities within the proposed PV facility	Moderate	Low	4	High
Increased shading, as a consequence of the PV arrays, will lead to changes in plant water relations and possible changes in plant community structures within the site.	Exposed soil susceptible to erosion	Negative	Site	Medium-Term	Moderate	Likely	High	Low	None identified	Low	Not Applicable	4	High

Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

Operational Phase													
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)		
Abstraction of groundwater for the cleaning of the PV panels, as well as for operational use, will alter the state of subsurface water resources.	Changes in water resource quantity and perhaps quality	Negative	Regional	Long term	Severe	Likely	Moderate	Low	<p>Preferential use of recycled water for operational phase requirements (instead of groundwater).</p> <p>The prudent use of surface water resources.</p> <p>Adopt “dry” cleaning methods, such as dusting and sweeping of the site before wash down.</p> <p>Increased monitoring of the impact of dust generation and implement a more judicious cleaning protocol.</p> <p>Low level and ongoing cleaning of the PV panels over time to reduce demand on aquifers.</p>	High	Moderate	3	Medium
Overhead transmission lines, as well as subtle changes in habitat are likely to result in the alteration of avian behaviour	Changes in faunal behaviour	Negative	Site	Long term	Slight	Likely	High	Low	None identified	Very low	Not Applicable	5	High

Operational Phase													
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)		
As a large area of land will be affected by multiple PV facilities, it is evident that any mortalities and injury associated with electrocution from fencing may be compounded	Cumulative change in faunal populations	Negative	Regional	Long term	Slight	Likely	High	Low	Management of potential sources of electrocution - electric fences	Low	Very low	5	High

**Table 7.10: Decommissioning Phase Impact assessment summary table**

Decommissioning Phase													
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)		
A reversion to the present seral stage, where continued grazing by livestock and herbivory by game will arise	Habitat and species change	Neutral	Site	Long-Term	Moderate	Very likely	Low	Low	None identified	Low	Not Applicable	4	Medium
A reversion of present faunal population states within the study area	Habitat and species population change	Neutral	Site	Long term	Moderate	Likely	High	Low	None identified	Low	Not Applicable	4	Medium
Changes in the geomorphological state of drainage lines as hydraulic changes arise within the catchment	Surface hydrology change	Neutral	Local	Long term	Moderate	Very likely	High	Low	None identified	Low	Not Applicable	4	Moderate
Exotic weed invasion as a consequence of abandonment of site and cessation of weed control measures	Habitat change	Negative	Local - Regional	Long term	Moderate	Very likely	High	Low	Weed control and land management	Moderate	Low	4	High

## 7.8 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

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Utilising the above information the following broad issues are considered within the Environmental Management Programme that would be associated with the proposed development.

### Pre-Construction Phase:

- Pre-construction evaluation and possible plant rescue operations;
- Identification of intrusion of the proposed construction site and development footprint, into minor drainage lines (if any);
- Identification of laydown areas, roadways etc. on site and evaluation of affected points within site, particularly in respect of floral and faunal presence; and
- Permitting requirements in terms of the National Water Act and Northern Cape Conservation Act.

### Construction Phase:

- Site induction and interaction within management on ecological aspects;
- Site inspection of any fauna within the construction area during post fencing completion;
- Monitoring of operations, including species presence within site, mortalities and sitings;
- Maintenance of vegetation and avoidance of unnecessary clearance of site;
- Exotic weed management; and
- Erosion control measures to be implemented where applicable.

### Post Construction Phase:

- Monitoring of faunal activities within the fenced area of the site and immediate proximity of site;
- Management of faunal intrusion through the fencing, including possible mortalities;
- Consideration of lighting regime around the site and the impact of ELP.
- Vegetation management on site - consideration of redress methods of growth and habitat form around site;
- Exotic weed management; and
- Erosion control measures.

## 7.9 CONCLUSION AND RECOMMENDATIONS

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The ecological evaluation of the site reviewed the entire property on the relevant portion of the Farm Onder Rugzeer. Such evaluation included consideration of the bio physical state of drainage systems, topographical features and a holistic review of all components within the ecological landscape. The evaluation of the results of desktop and field reconnaissance identified and served to develop a plan for the exclusion of particular areas from any proposed development of a PV facility. Included in the assessment was consideration of terrestrial and hydrological systems, as well as fauna (including avi-fauna). Major impacts identified as a consequence of the development proceeding relate to, inter alia;

- Changes in the broader habitat as a consequence of variation in physical factors within the site (e.g. shading of vegetation, changes in surface water flow regime);
- Changes in the broader surface and possibly sub surface hydrology; and
- The ousting, and in some cases recruitment of species, with subsequent variation in populations in and around the development.

The ecological evaluation has determined that with the exclusion of the identified drainage areas from the development, within the subject site, the requisite ecological components associated with these features will be retained in a broader perspective, with only subtle changes to the eco-

geomorphology of these systems becoming evident on minor drainage features. There will be minor to moderate changes evident in the terrestrial environment resulting from the development which in turn will be manifest in changes in faunal components of the environment.

None of the above impacts have been identified as being of high significance (with the implementation of mitigation measures), most impacts arising can be considered to be of low to very significance in a holistic evaluation.

Given the above information, it is evident that with the judicious placement of the proposed solar PV facility within the boundaries of the study area, this proposed development cannot be precluded from the portion of the Farm Onder Rugzeer, presently under consideration and as such authorisation may be granted in this respect. Judicious management of the site would include:

- Avoidance of major drainage lines identified in the report;
- Avoidance of excessive clearance of vegetation within the site;
- Management of exotic weed invasion that may arise;
- Management of fauna within the site and surrounds, as well as the incorporation of “wildlife” porosity into fence lines and the implementation of measures on the energised fence line to avoid mortalities to wildlife; and
- General land management practices to avoid excessive erosion, dust emissions and possible sources of pollution to ground and surface water resources.

The above, along with the various mitigation measures espoused in this report should be incorporated as conditions, into any authorisation granted by the relevant authority.

It is our opinion that with the implementation of the above, the project proposal, which entails the laying down of a PV facility some 250ha in extent, subject to final design and adherence to the above recommendations, can be accommodated on site and should therefore be authorised.

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Strauss P - personal communications. Local farmer and tenant on subject site

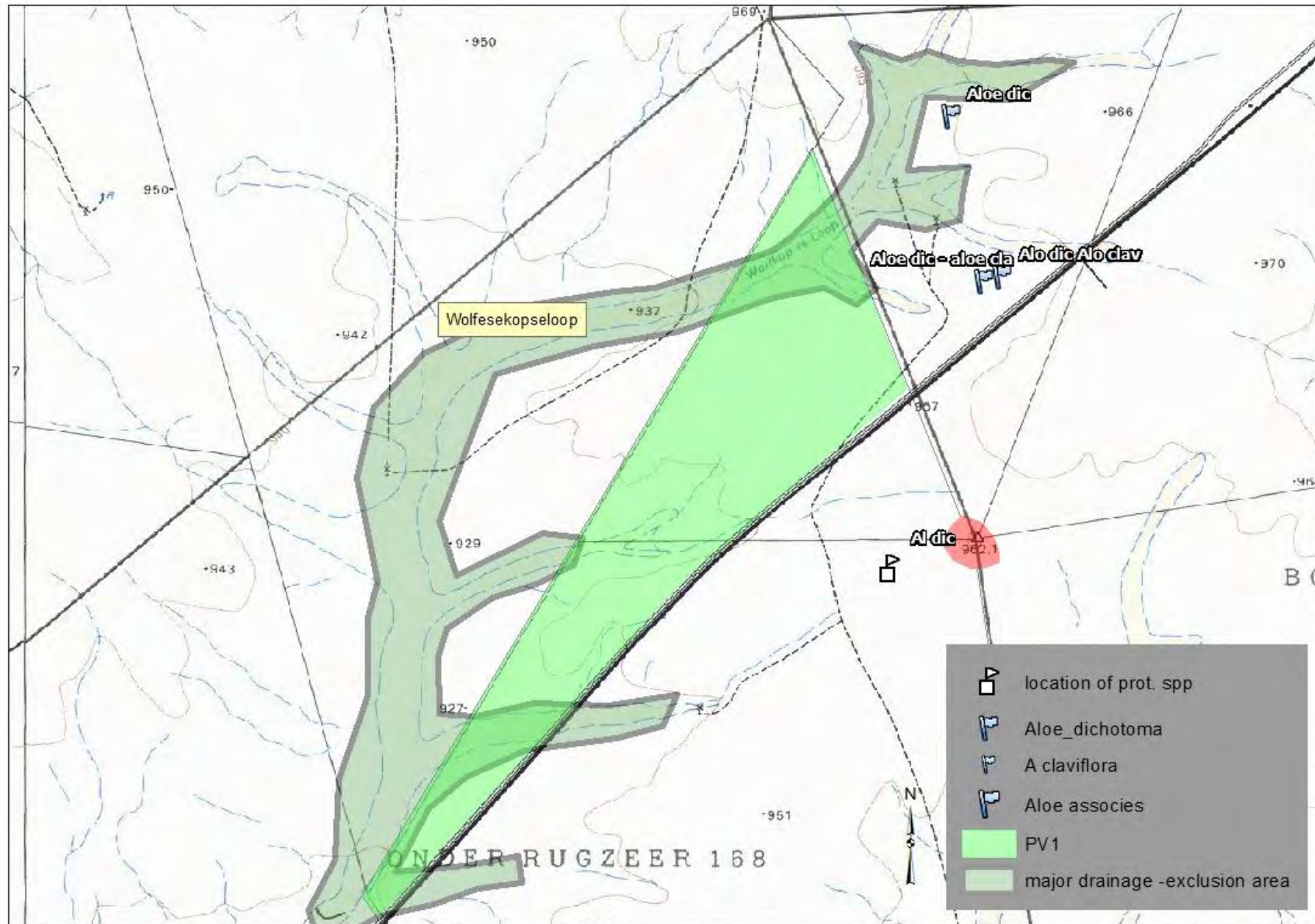
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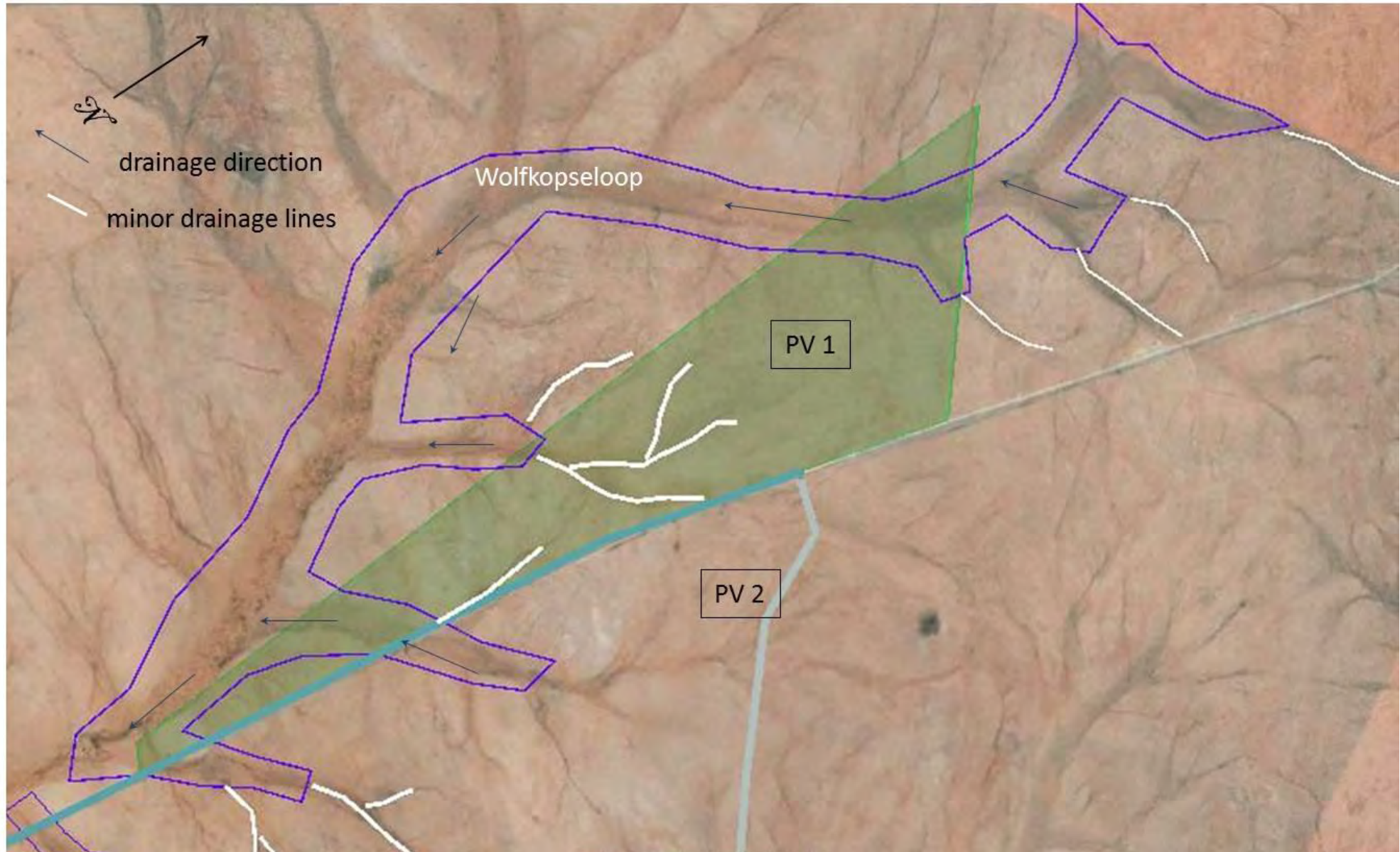
[www.koeppen-geiger.vu-wien.ac.at](http://www.koeppen-geiger.vu-wien.ac.at)

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## APPENDIX 7.A

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# EIA REPORT



## CHAPTER 8:

# Visual Impact Assessment

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

*Report prepared for:*

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*Report prepared by:*

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---

April 2016

## 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 and Section 8.1.6 of this chapter
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 8.1.3
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 8.3
g) an identification of any areas to be avoided, including buffers;	Section 8.3
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 8 1 and Section 8.3
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 8.7
k) any mitigation measures for inclusion in the EMPr;	Section 8.9
l) any conditions for inclusion in the environmental authorisation;	None
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8.9
n) a reasoned opinion-	Section 8.10
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 8.5.1
q) any other information requested by the competent authority.	None

# list of abbreviations

DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
CPV	Concentrated Photovoltaic
DEM	Digital Elevation Model
GIS	Geographic Information System
PV	Photovoltaic
VIA	Visual Impact Assessment

# glossary

<i>Definitions</i>	
<i>Cumulative viewshed</i>	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.
<i>Digital Elevation Model (DEM)</i>	A digital or computer representation of the topography of an area.
<i>Landscape baseline</i>	A description of the existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA, 2002).
<i>Landscape character</i>	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).
<i>Landscape impacts</i>	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.
<i>Sense of place</i>	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).
<i>Viewer sensitivity</i>	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.
<i>Viewshed</i>	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.
<i>Visual exposure</i>	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.
<i>Visual impact assessment</i>	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.
<i>Visual intrusion</i>	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).
<i>Visual receptors</i>	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.
<i>Visual resource</i>	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



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## 8 VISUAL IMPACT ASSESSMENT

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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 Kenhardt PV 1 project within the Northern Cape Province.

### 8.1 INTRODUCTION AND METHODOLOGY

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#### 8.1.1 *Scope and Objectives of the Specialist Study*

---

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 Kenhardt PV 1) on the remaining extent of Onder Rugzeer Farm 168. 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.

#### 8.1.2 *Terms of Reference*

---

The Terms of Reference for the Visual Impact Assessment 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.

### 8.1.3 Approach and Methodology

This Visual Impact Assessment (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.

#### VIA

A GIS ([TNTmips<sup>1</sup>](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.

### 8.1.4 Assumptions and Limitations

#### 8.1.4.1 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 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 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/ 33 kV/ 22 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/ 33 kV/ 22 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);

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

- Proposed Mulilo Renewable Project Developments (Pty) Ltd Solar PV projects: Phase 1 (i.e. Boven Solar PV 1 (on the remaining extent of the Farm Boven Rugzeer 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.

#### **8.1.4.2 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).

#### **8.1.5 Source of Information**

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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 database<sup>2</sup>;
- 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 3<sup>3</sup>;
- Protected Areas Data Release - Third Quarter 2015<sup>3</sup>;
- Eskom SPOT Building Count data set (de la Rey 2008); and
- 2013 Garmin map data for 'points of interest' layer.

#### **8.1.6 Declaration of Independence of Specialist**

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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 8.1 below and included in Appendix B of this EIA Report.

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<sup>2</sup> <http://www.ngi.gov.za>

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



**BOX 8.1: 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 Kenhardt PV 1 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

**8.2 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 8.1 below shows the proposed locality of the Kenhardt PV 1 Solar Facility.

All maps provided in this report are included in A3 format in Appendix 8.A of this chapter.

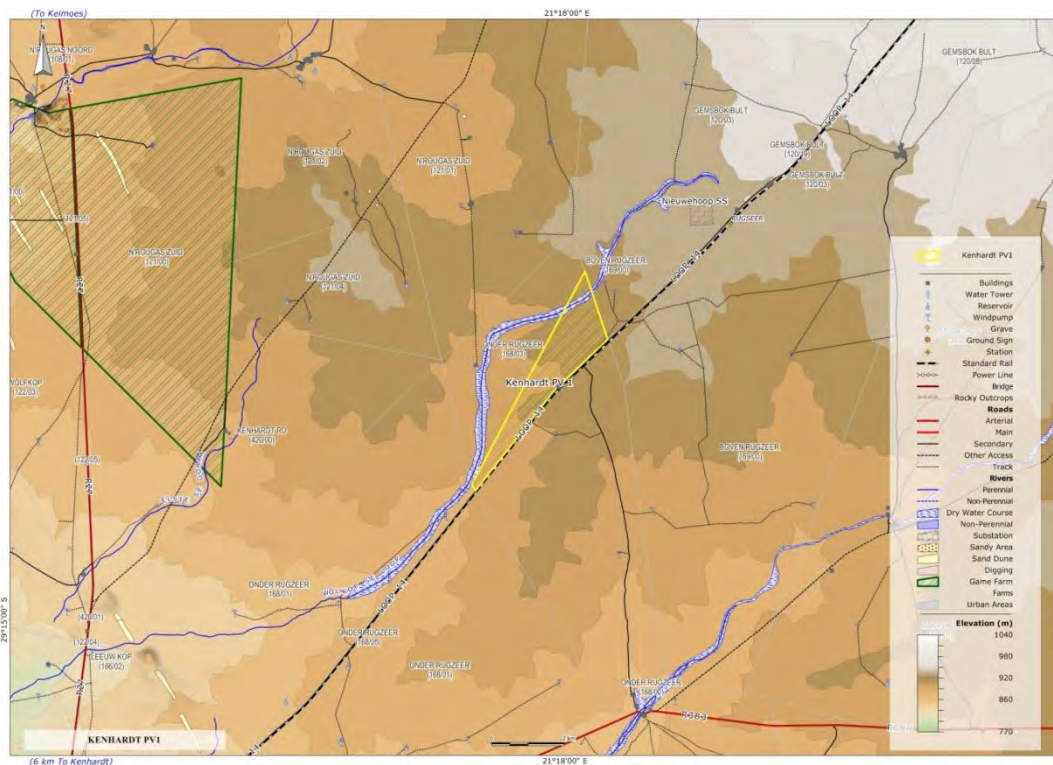


Figure 8.1: Proposed Kenhardt PV 1 solar energy facility site.

### 8.2.1 Construction and Decommissioning Phases

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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.

### 8.2.2 Operational Phase

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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<sup>4</sup> (30 m high) - these are likely to extend above the skyline for most 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.

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<sup>4</sup> The potential visual impact for the 132 kV overhead distribution line is assessed separately in a Basic Assessment Report.

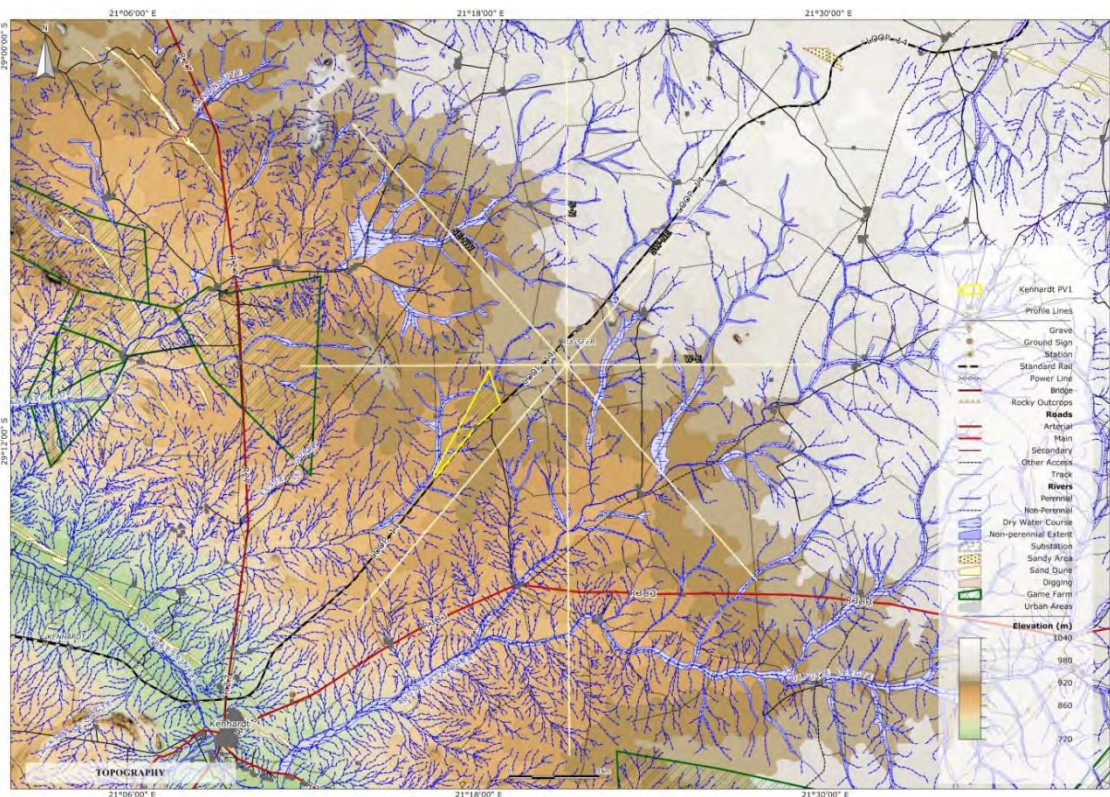
**Table 8.1: Heights of components used in viewshed analysis**

Component	Maximum Height
Solar Panels	10 m
Inverter Stations	4 m
Operations Buildings	7 m
On-site Substation	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. The information regarding the proposed 132 kV transmission line is indicatively provided in this report. A detailed description of the transmission line corridor is provided and assessed separately in the Basic Assessment for the Kenhardt PV 1 - Transmission Line project.

### 8.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The topography in the region surrounding the proposed development site is relatively flat with low open hills (Figure 8.2). 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 Rugzeer River are tributaries of the Hartbees River which pass through the study area (Figure 8.3b and c). Rivers in this region only flow during heavy rain and are normally dry riverbeds.



**Figure 8.2: Topographic map of the region**

Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

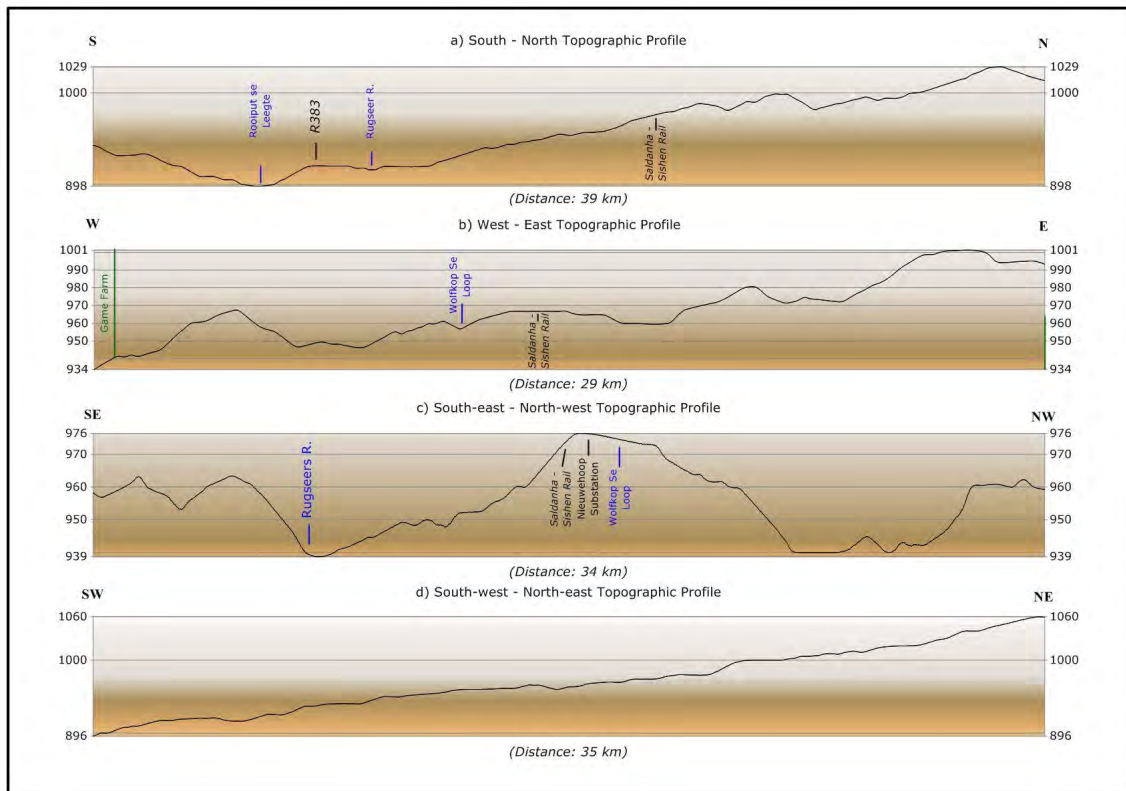


Figure 8.3: a) South-North Topographic Profile, b) East-West Topographic Profile, c) South-east - North-west Topographic Profile, d) South-west - North-east Topographic Profile. Topographic profiles as indicated on the topographic map above.

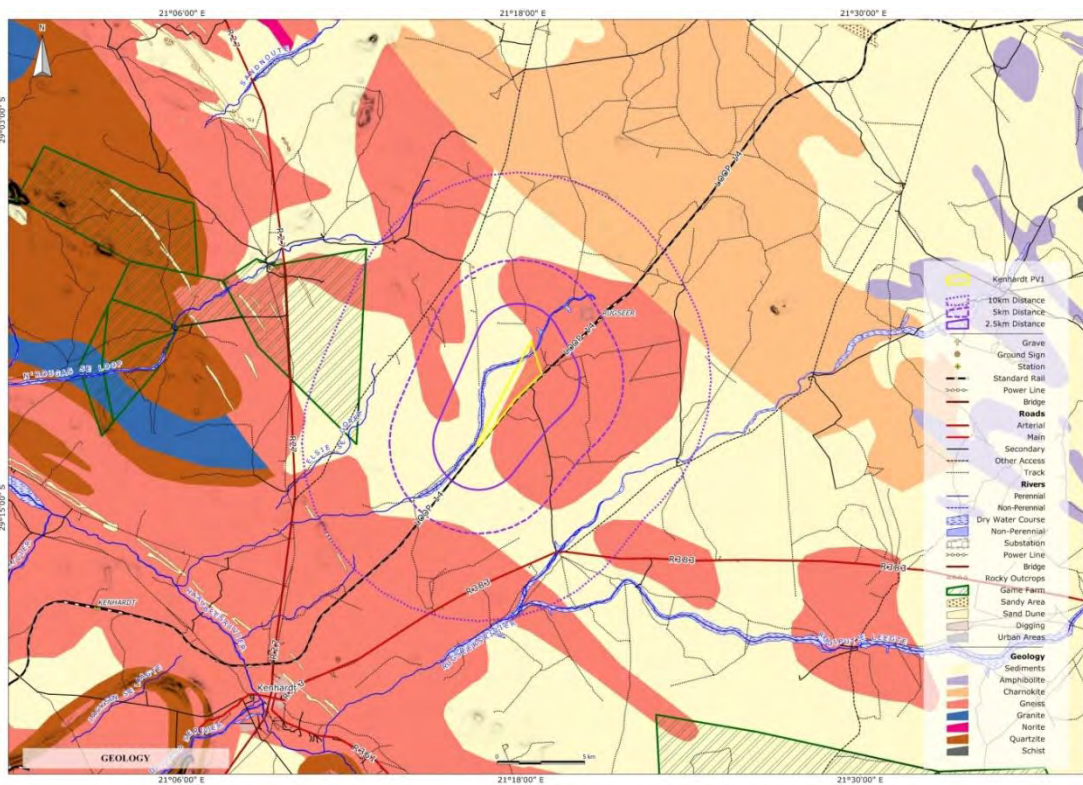


Figure 8.4: Simplified geology of the region.

The geological history of the region is complex with multiple metamorphic and deformation events (Figure 8.4). 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.

The study area is covered in grassland with low shrubs (Bushmanland Arid Grassland) which has been transformed by live-stock grazing (Figure 8.5). 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.

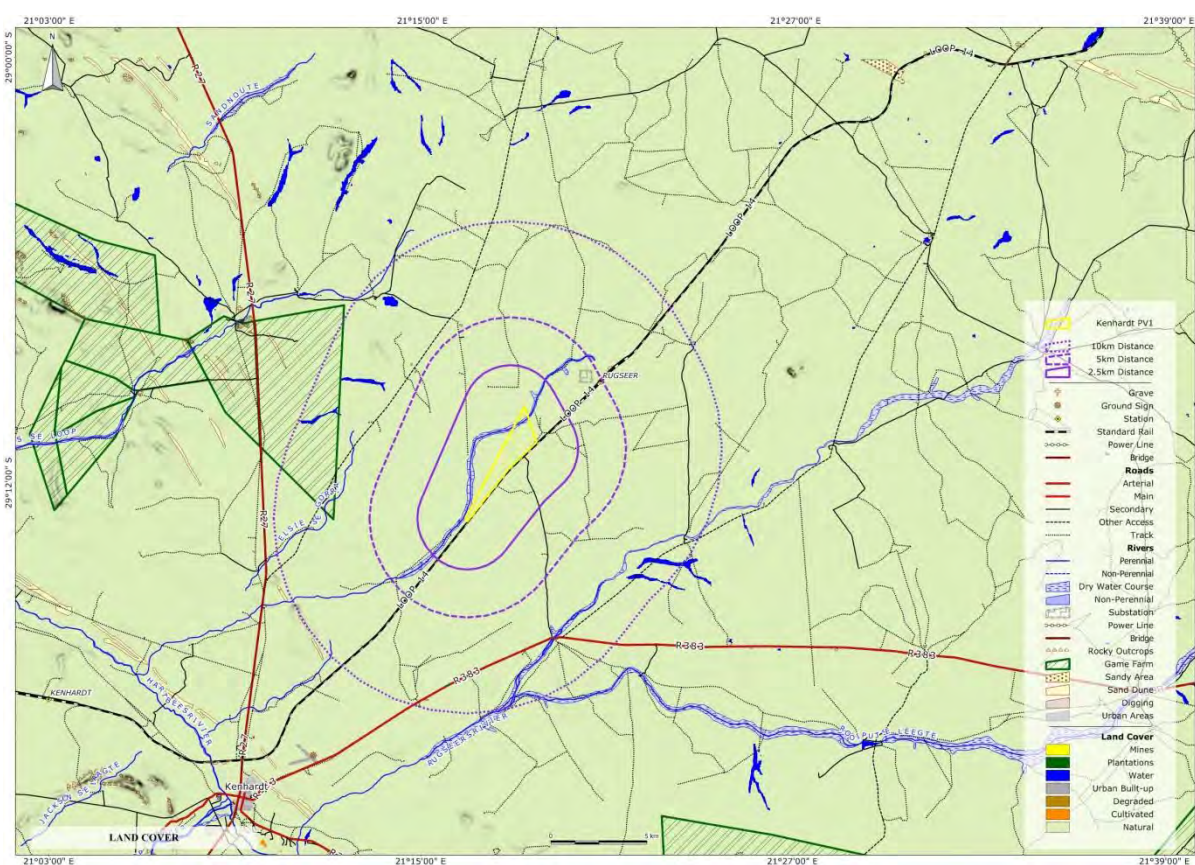


Figure 8.5: Land cover map of the region.

Kenhardt provides a service centre for the surrounding agricultural community (Figure 8.6). 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.

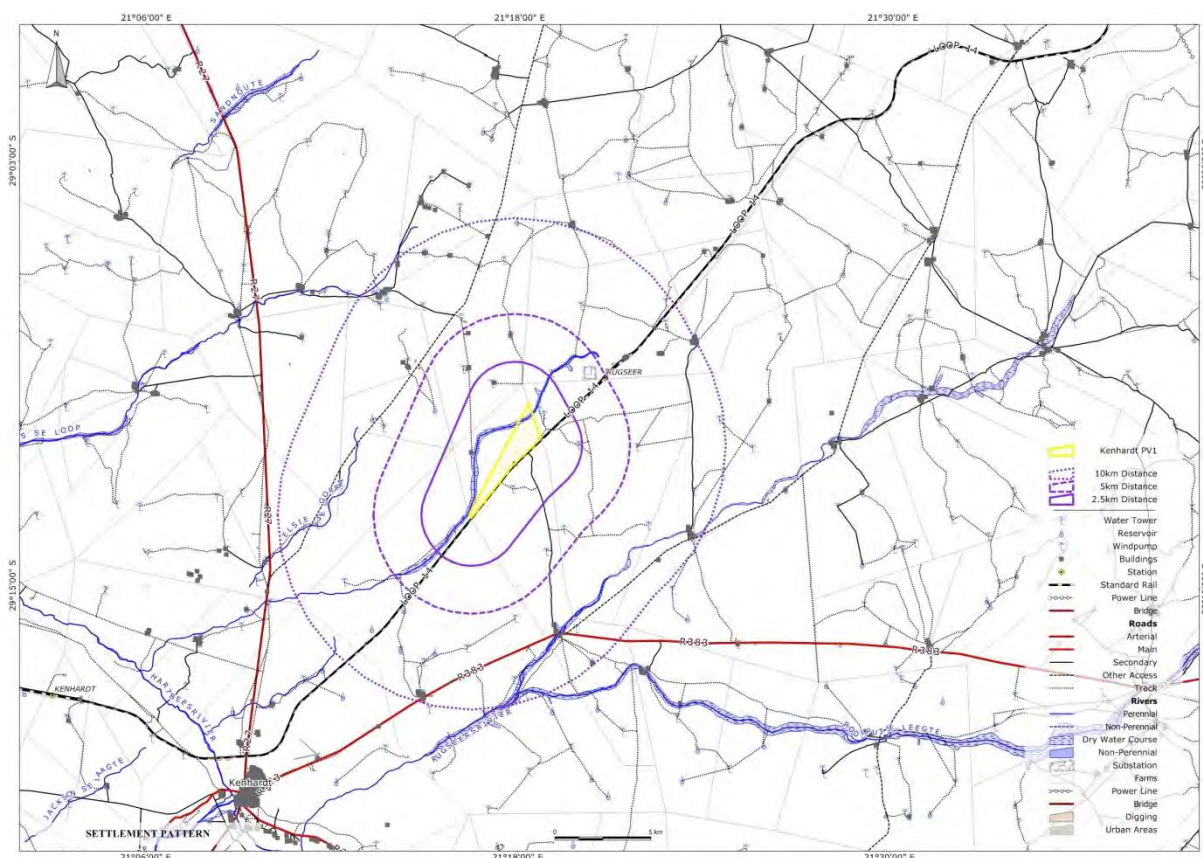


Figure 8.6: Prominent man-made structures and settlement patterns in the landscape.

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.

## 8.4 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 Kenhardt PV 1 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.

## 8.5 IDENTIFICATION OF KEY ISSUES

### 8.5.1 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 25 September 2015 to 27 October 2015. The Addendum to the Scoping Report was also released for a 30-day comment period, extending from 6 October 2015 to 5 November 2015. The EIA Report was also released for a 30-day comment period in March 2016. To date, no specific comments have been raised by I&APs that relate to visual impacts. However, the following comments relating to dust

generation and potential glare from the PV panels were raised by Transnet Freight Rail on 19 August 2015:

*The following immediate concerns are:*

- *Possible glare from the solar panels which may influence the Train Drivers and staff travel on the TFR service road.*

It is important to note that the anticipated glare produced by the solar PV panels will not exceed the Standard Industry Norm generally accepted throughout South Africa. The glass used in the manufacture of PV panels is designed to maximize the absorption of light (to improve the energy efficiency of the panels) and minimize reflection and glare. PV panels are less reflective than water and it is therefore not anticipated to influence train drivers and users of the TFR Service Road. Many airports in Europe and the United States of America have installed solar fields on airport building roofs and glare has not been an issue for pilots using these airports.

### **8.5.2 Identification of Potential Impacts**

Features at risk of impact in a VIA are the landscape and sensitive visual receptors in the landscape.

#### **8.5.2.1 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, Rugseer Siding and substation. As a result the landscape character has a low sensitivity to the proposed development.

#### **8.5.2.2 Sensitive Visual Receptors**

The viewshed map (Figure 8.7) shows 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 2 km of the R383 (approximately 1.5 minutes at 80 km/h) will be within the viewshed but these sections are more than 9 km from the site. Motorists using the gravel road adjacent to the Sishen-Saldanha railway line will potentially be in the viewshed for 15 km and will pass within 100 m of the solar field (depending on the final layout of the development).

*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.



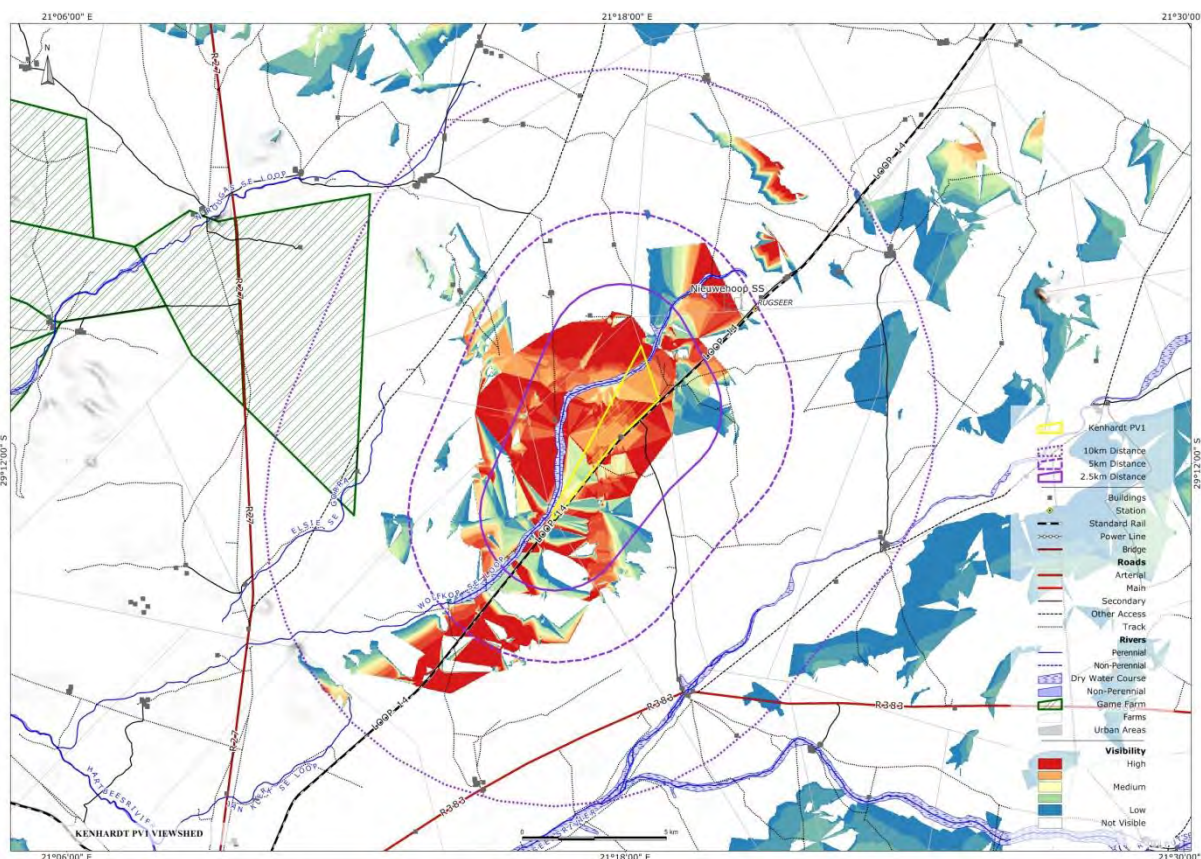


Figure 8.7: Viewshed of the proposed Kenhardt PV 1 facility.

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.

#### 8.5.2.3 Potential Impacts Identified for the Construction Phase

- Potential visual intrusion of construction activities (discussed in Section 0) on existing views of sensitive visual receptors.

#### 8.5.2.4 Potential Impacts Identified for the Operational Phase

- Potential landscape impact of a large solar energy facility on a rural agricultural landscape;
- Potential visual intrusion of the proposed solar energy facility 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.

#### 8.5.2.5 Potential Impacts Identified for the Decommissioning Phase

- Potential visual intrusion of decommissioning activities (discussed in Section 0) on views of sensitive visual receptors.

### 8.5.2.6 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.

## 8.6 VISUAL IMPACT CONCEPTS AND ASSESSMENT CRITERIA

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The assessment of potential impacts for the proposed Kenhardt PV 1 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.

### 8.6.1 Visibility Ratings

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Visibility is the geographic area from which the proposed project will be visible, or view catchment area (Figure 8.7). 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 22 km<sup>2</sup>. The actual viewshed is likely to be similar to the calculated viewshed since existing vegetation in the region is low and will not affect the visibility of the development. However, there are only 20 buildings that will be affected (not all of which are residences) which indicate a low number of potentially affected visual receptors. Visibility for this project is therefore **low**.

### 8.6.2 Visual Exposure

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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

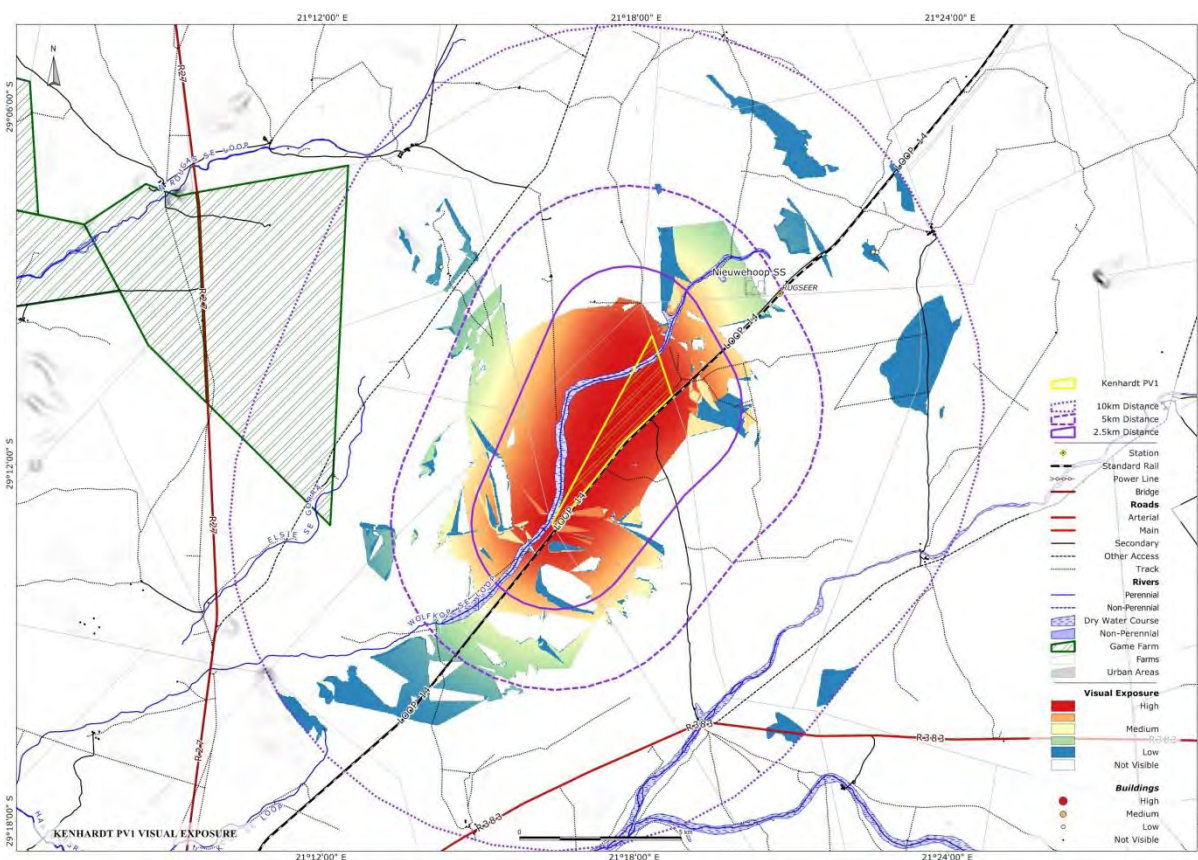


Figure 8.8: Visual exposure for sensitive visual receptors within 10 km of the development.

### 8.6.2.1 Residents and Viewpoints on Surrounding Farms

There are no buildings that will be highly or moderately 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 8.8).

### 8.6.2.2 Motorists

The R383 is 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. A 10 km (approximately 8 minutes at 80 km/h) section of the Transnet road (Loop 14) will be highly exposed to the development.

## 8.6.3 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.

### 8.6.3.1 Photographic Survey

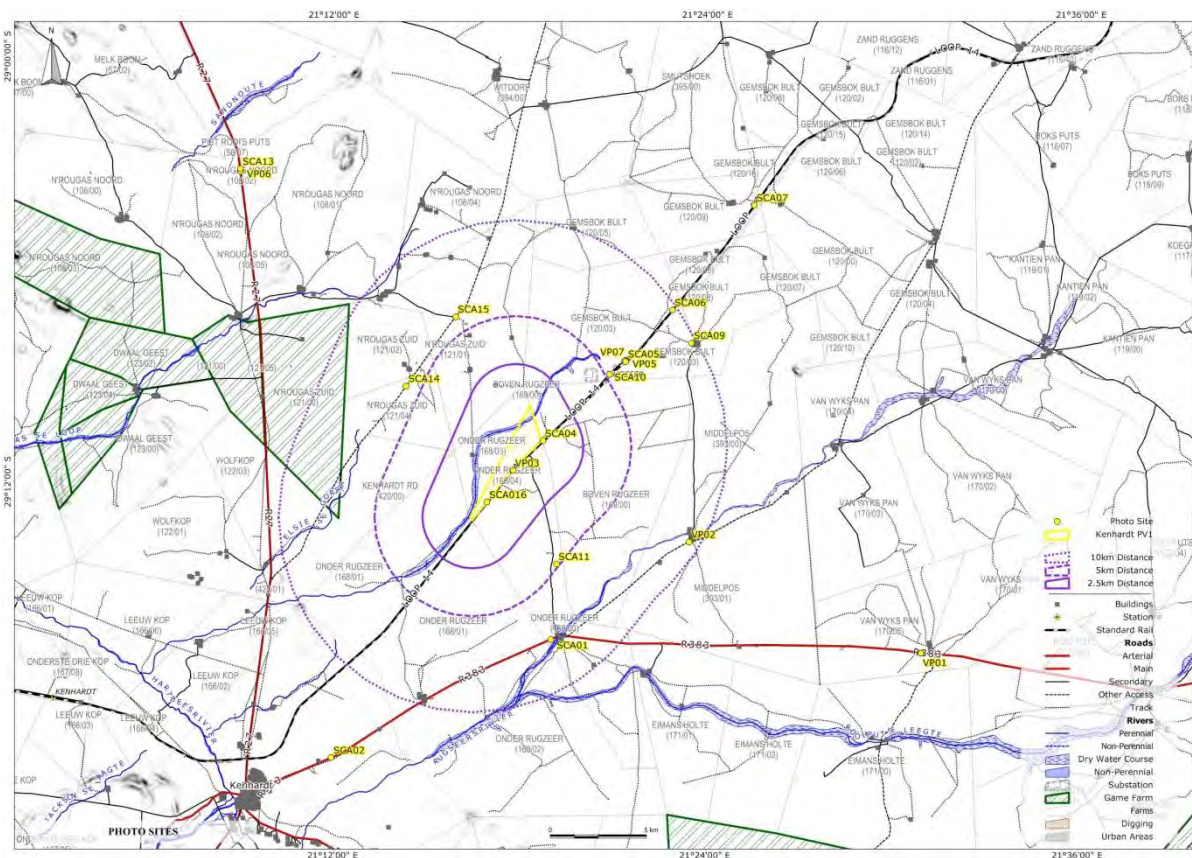


Figure 8.9: Sites visited during photographic survey (SCA - October 2015; VP - June 2014)

Sites from which landscape photographs were taken are shown in Figure 8.9. 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 adjacent to the Sishen-Saldanha railway line (Figure 8.10). 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 8.11). The siding at Rugseer is a relatively large structure and its tower is highly visible in the landscape (Figure 8.12 and Figure 8.13). 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 8.14).



Figure 8.10: View north-east from viewpoint SCA016. The proposed site for the development is west of and adjacent to the Transnet Service Road (Loop 14) (adjacent to the Saldanha-Sishen Railway Line). The Saldanha-Sishen railway line is a major element of the existing landscape.



Figure 8.11: Empty ore train (Photo site VP03)



Figure 8 12: The tower at the Rugseer Siding as seen from photo site SCA011.



Figure 8.13: View from photo site SCA014 eastwards. The tower at Rugseer Siding is visible on the left and the new substation more towards the centre.



Figure 8.14: Nieuwehoop Substation currently under construction (Photo site SCA010)

#### **8.6.3.2 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 the contrast in colour and texture) it will partially fit into the surrounding landscape (which already includes large and visible structures).

#### **8.6.3.3 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** to **high** 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 highly noticeable at this distance.

**Table 8.2: Visual Impact Criteria and Impact Intensity for the Kenhardt PV 1 project**

Development Alternative	Sensitive Viewer	Criteria	Rating	Reasoning
Kenhardt PV 1	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 100 m 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.



## 8.7 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

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### 8.7.1 Construction Phase: Potential Visual Intrusion of Construction Activities on Existing Views of Sensitive Visual Receptors

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#### 8.7.1.1 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.

#### 8.7.1.2 Mitigation Measures

Assumptions regarding the management of construction activities are discussed in section 8.1.4.1. 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.

## 8.7.2 Operational Phase: Potential Landscape Impact of a Large Solar Energy Facility on a Rural Agricultural Landscape

### 8.7.2.1 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.

## 8.7.3 Operational Phase: Potential Visual Intrusion of the Proposed Solar Energy Facility on the Views of Sensitive Visual Receptors

### 8.7.3.1 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. 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 **medium** since a large area (250 ha) will be cleared of existing vegetation and rocks, and landscaped to accommodate the proposed solar field and ancillary structures. It is unlikely that this area can be completely rehabilitated to its pre-construction state and due to the aridity 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 vegetation 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 **moderate** since very few 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.

### 8.7.3.2 Mitigation Measures

#### Solar Arrays

- The project developer should maintain re-vegetated 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.

## **8.7.4 Operational Phase: Potential Impact of Night Lighting of a Large Solar Energy Facility on the Nightscape of the Region**

### **8.7.4.1 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 Rugseer 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.

### **8.7.4.2 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.

### **8.7.5 Potential Visual Intrusion of Decommissioning Activities on Views of Sensitive Visual Receptors**

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#### **8.7.5.1 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 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.

#### **8.7.5.2 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**.

### **8.7.6 Cumulative Impact of Solar Energy Generation Projects and Large Scale Electrical Infrastructure on the Existing Rural-Agricultural Landscape**

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#### **8.7.6.1 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 8.15) are being proposed for the region immediately surrounding the proposed Kenhardt PV 1 project area (within 20 km of the site - see section 8.1.4.1, as well as Chapter 4 of the EIA 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 Kenhardt PV 1 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.

### ***8.7.7 Cumulative Visual Impact of Solar Energy Generation Projects and Large Scale Electrical Infrastructure on Existing Views of Sensitive Visual Receptors in the Surrounding Landscape***

#### ***8.7.7.1 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 8.15) and associated electrical infrastructure will affect the existing visual resources but since the visual resources 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 Kenhardt PV 1 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.

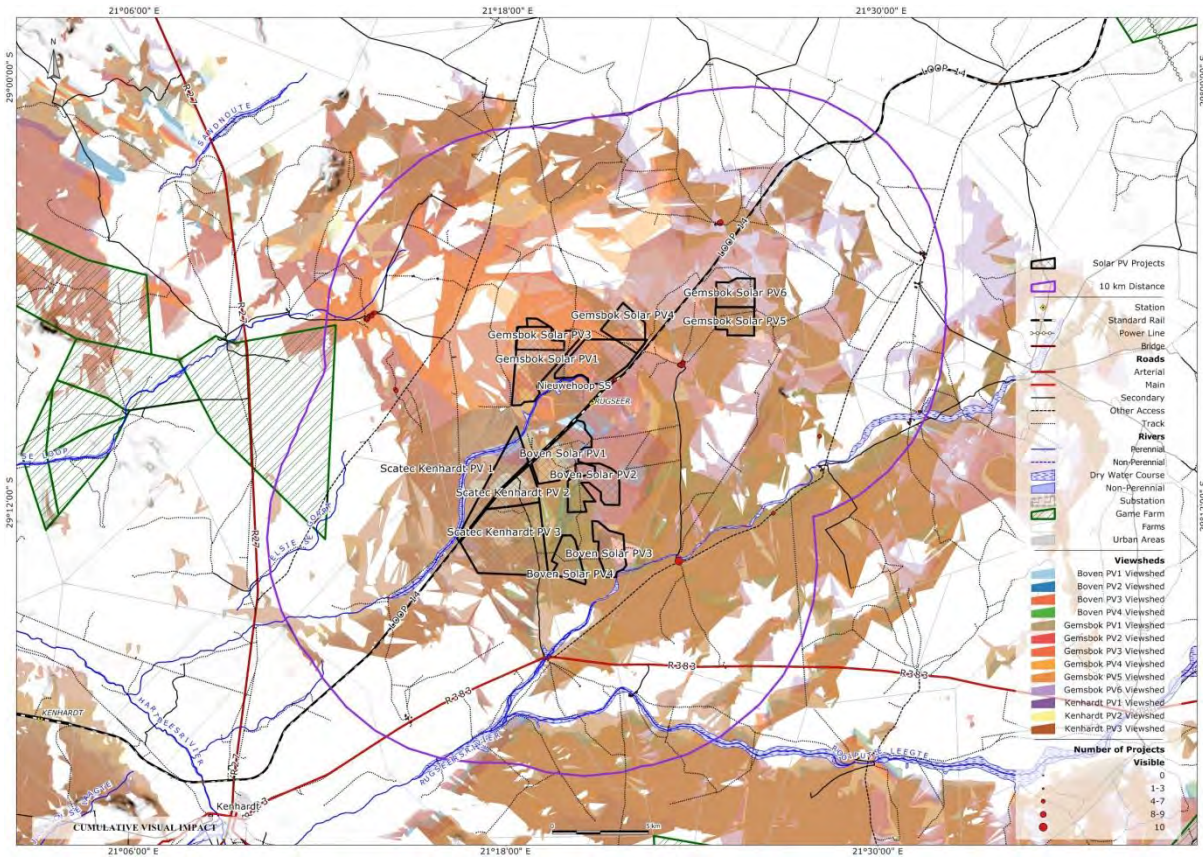


Figure 8.15: Map showing viewsheds for proposed solar energy projects in the region (where data was available). The map also provides an indication of the number of projects that may be visible from buildings within 10 km of a project (views may be of only small parts of a project).

## 8.8 IMPACT ASSESSMENT SUMMARY

**Table 8.3: 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	Proba- bility	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 construction activities on existing views of sensitive visual receptors	Loss of visual resources	Negative	Regional	Short to Medium 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

**Table 8.4: Impact assessment summary table for the Operational Phase**

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Proba- bility	Reversibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi- dence Level
										Without Mitigation/ Managem- ent	With Mitigation/ Management (Residual Impact/ Risk)		
Potential landscape impact of a large Solar Energy Facility on a rural agricultural landscape	Change of landscape character	Negative	Regional	Long Term	Slight	Very 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	Substanti- al	Likely	Medium	Low	Building facades and colours such that they blend in with the landscape background where technically feasible.	Moderate	Low	4	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 8.5: Impact assessment summary table for the Decommissioning Phase**

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Probabilit- y	Reversibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confi- dence Level
										Without Mitigation/ Managemen t	With Mitigation/ Management (Residual Impact/ Risk)		
Visual impact of decommissio ning activities on existing views of sensitive visual receptors	Impact on visual resources.	Negative	Regional	Short Term	Substanti al	Very Likely	Low	Low	Rehabilitation of areas cleared for solar field	Moderate	Low	4	High

**Table 8.6: Cumulative impact assessment summary table**

Cumulative Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Probabilit- y	Reversibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confiden- ce Level
										Without Mitigation/ Managemen- t	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	4	High

## 8.9 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

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### 8.9.1 *Planning and Design*

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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. Phased clearing for construction of the solar field should be planned so that construction follows clearing as soon as possible in order to minimize the area of soil exposed and for a minimum duration. 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).

### 8.9.2 *Construction Phase*

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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.

### 8.9.3 *Operational Phase*

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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.

### 8.9.4 *Decommissioning Phase*

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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.

## 8.10 CONCLUSION AND RECOMMENDATIONS

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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 very 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 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 Kenhardt PV 1 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.

The visibility analysis indicates that the significance of the potential visual impacts will not be influenced by the exact location within the surveyed area of the 250 ha required for the facility. The analysis was conducted using maximum heights for structures in order to simulate a worst case scenario.

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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## 8.11 REFERENCES

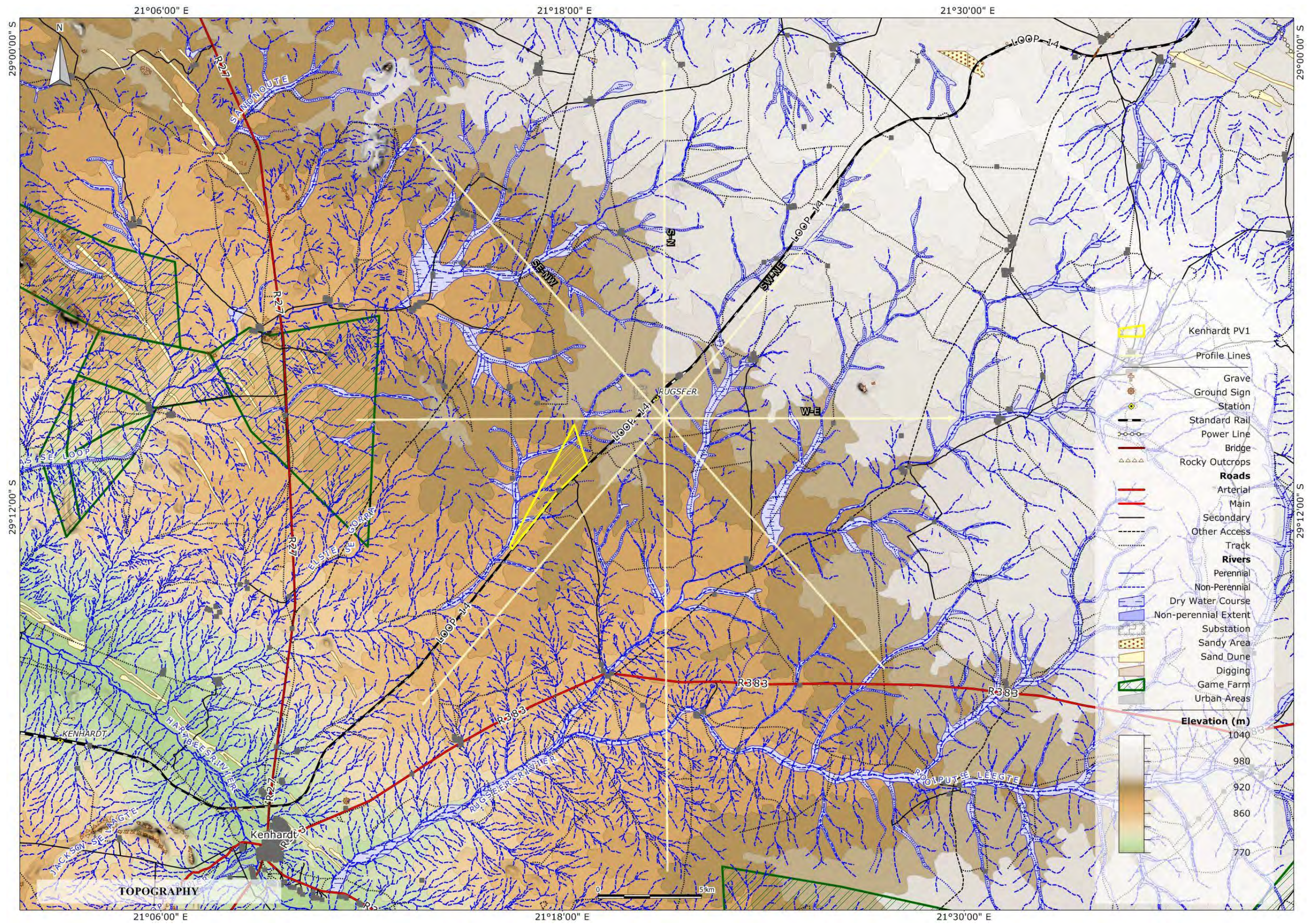
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## APPENDIX 8.A - MAPS IN A3 FORMAT

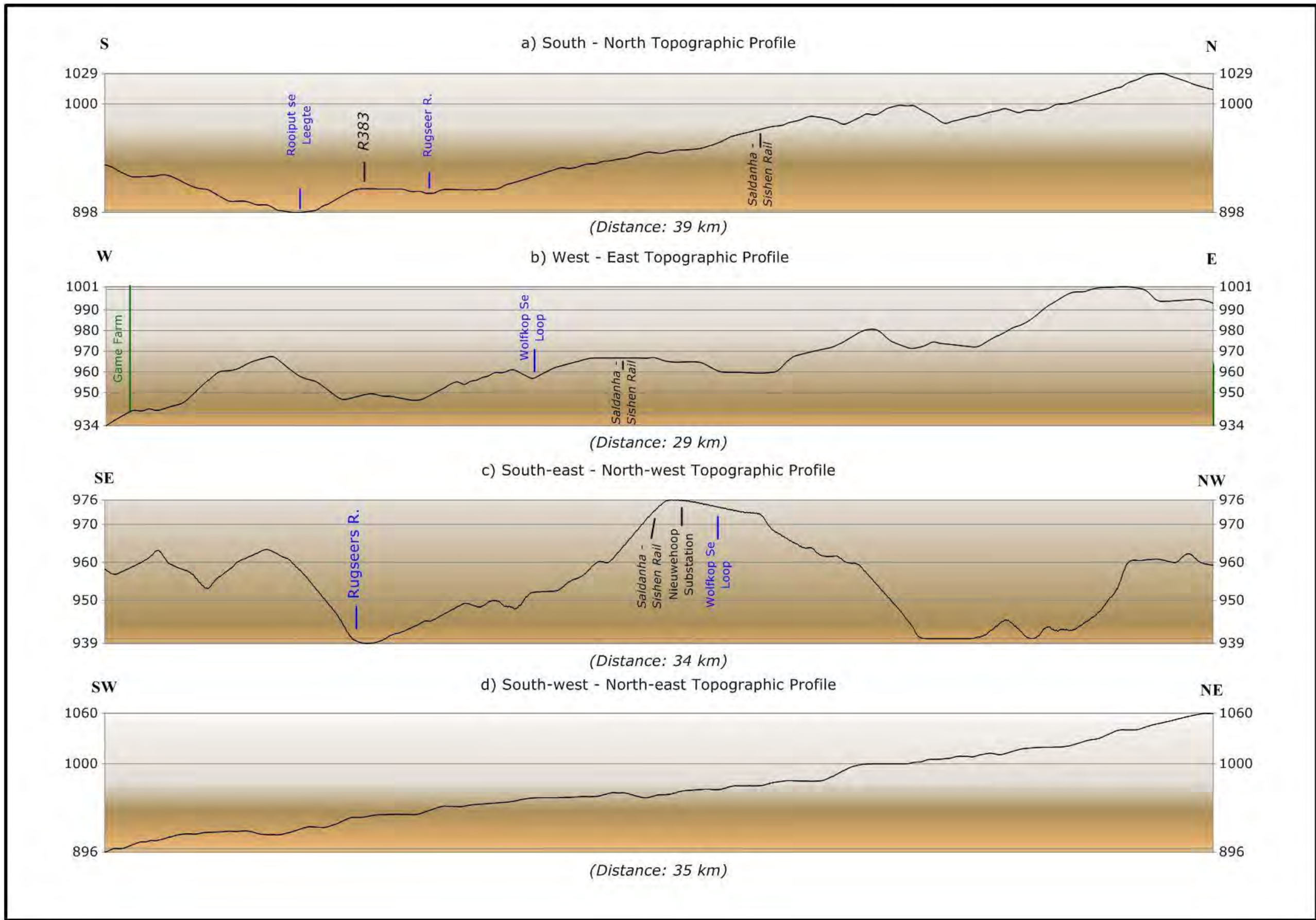
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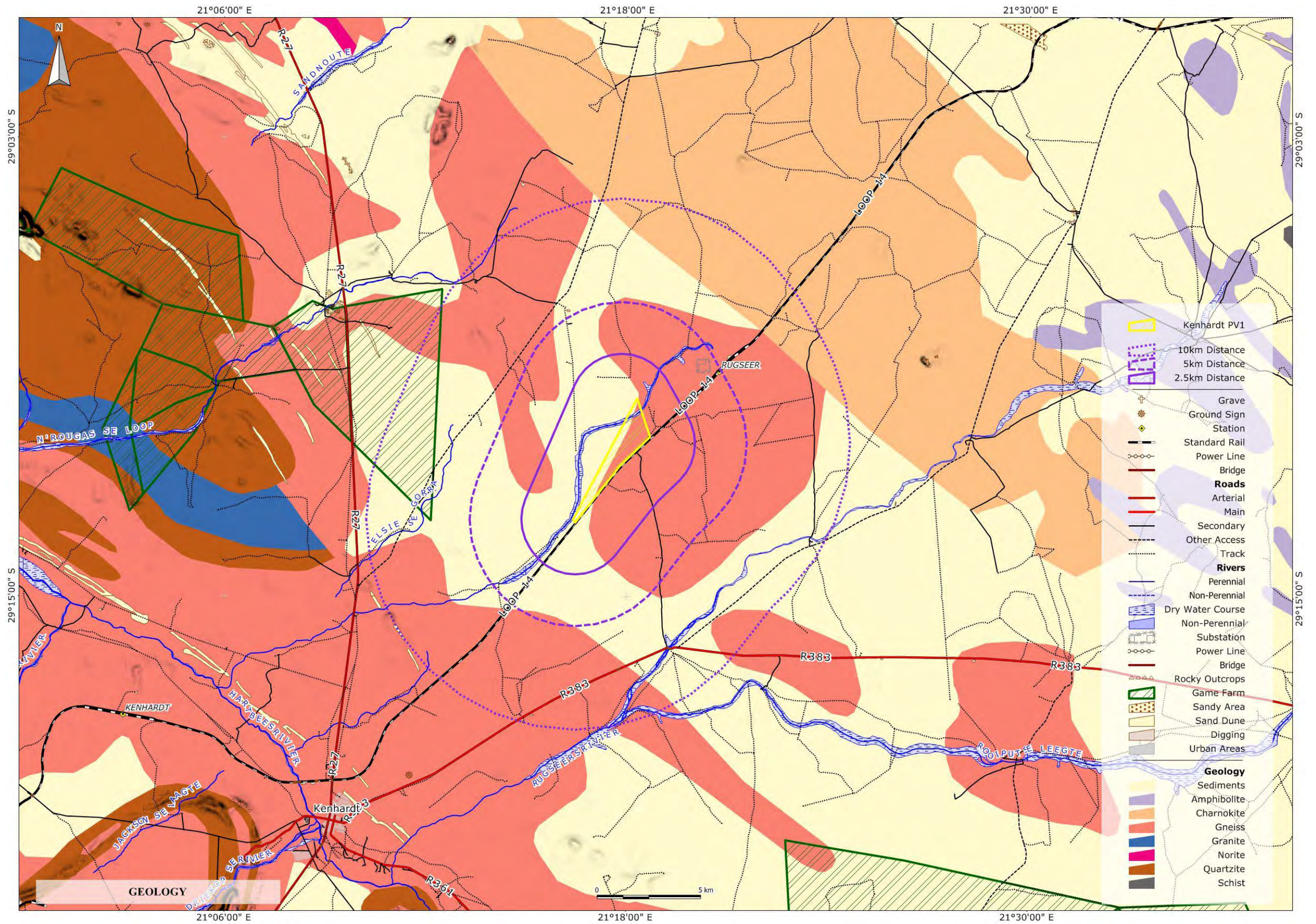


Map 2: Topographic map of the region.

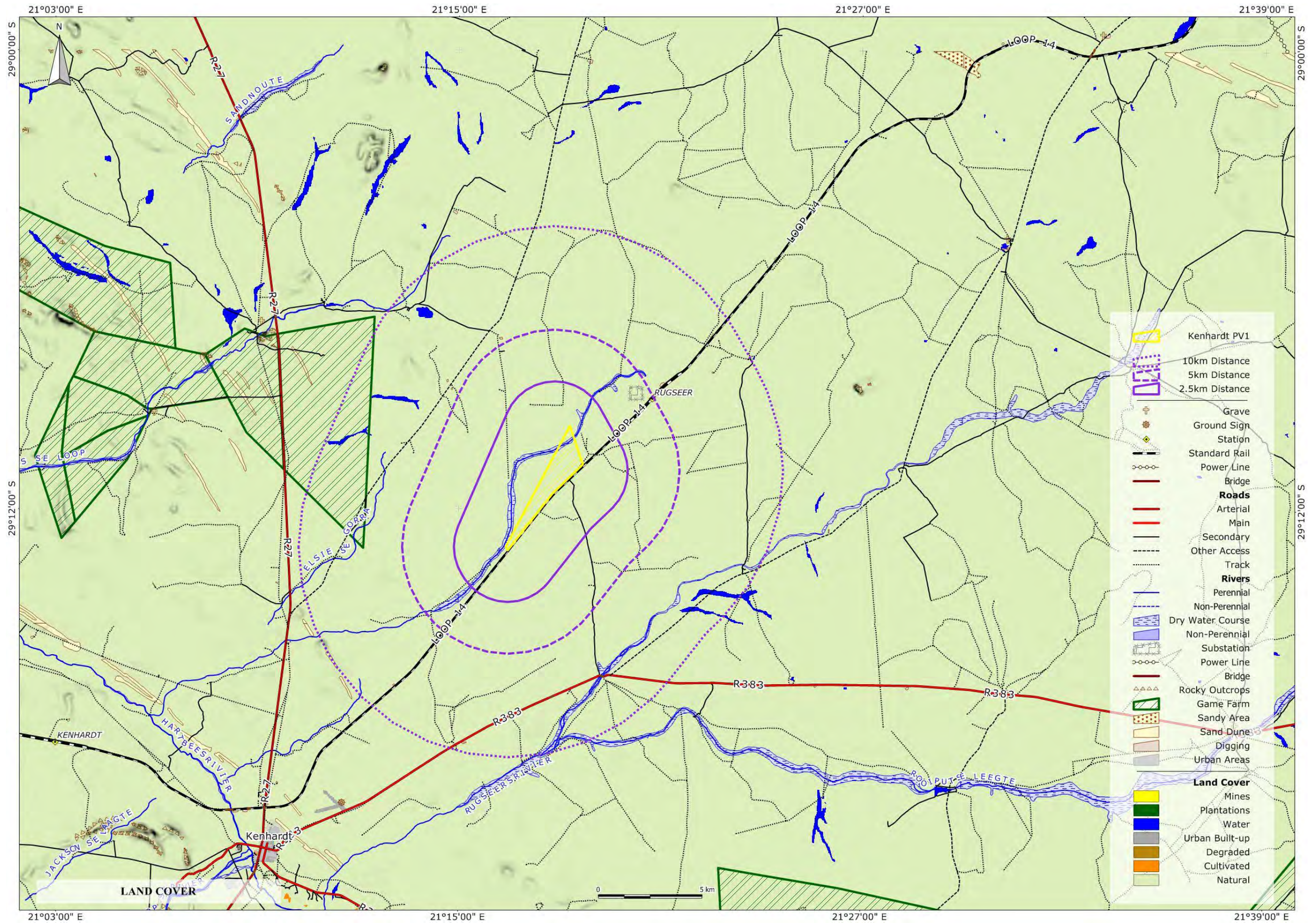




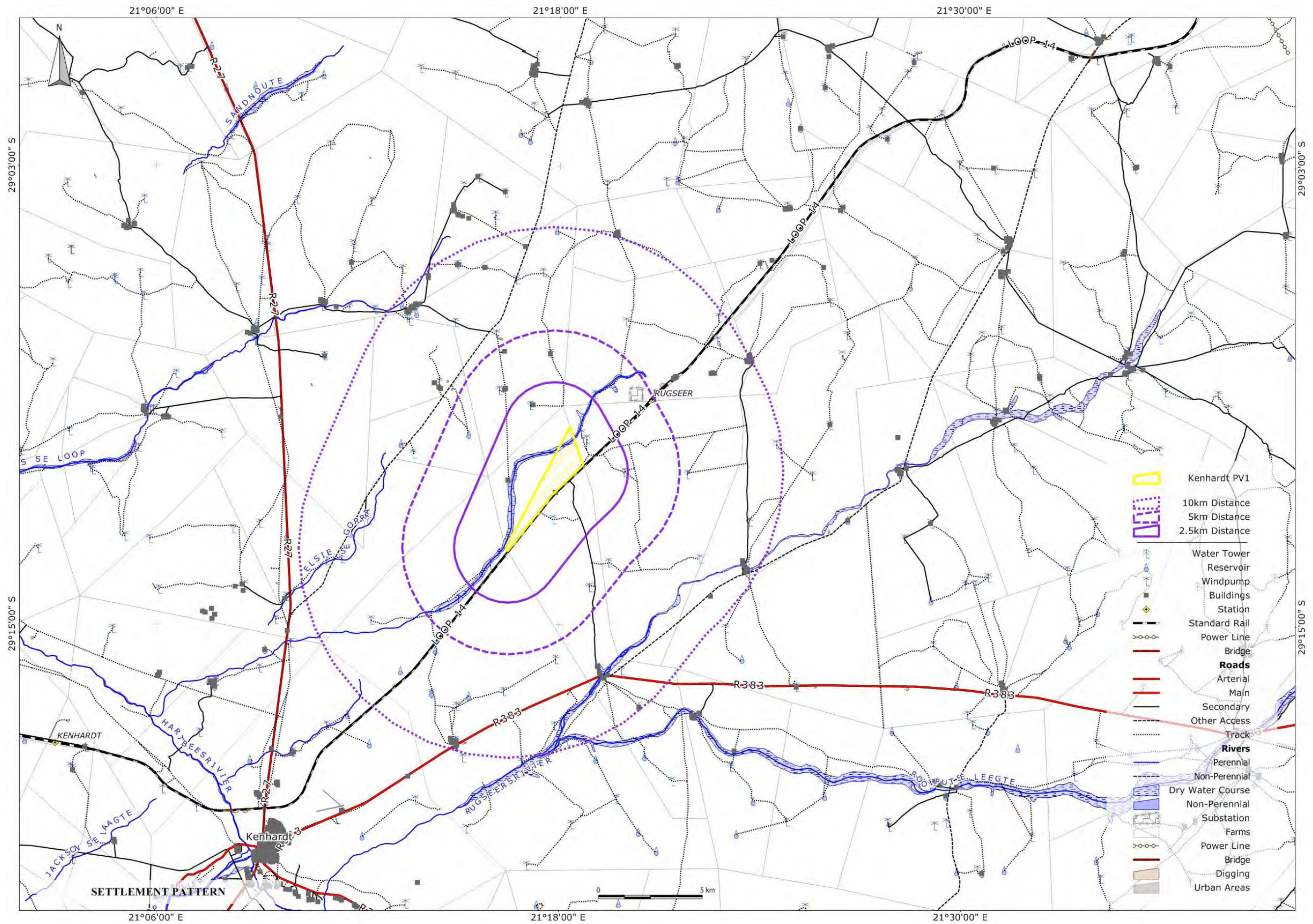
Map 3: a) South-North Topographic Profile, b) East-West Topographic Profile, c) South-east - North-west Topographic Profile, d) South-west - North-east Topographic Profile. Topographic profiles as indicated on the topographic map above.



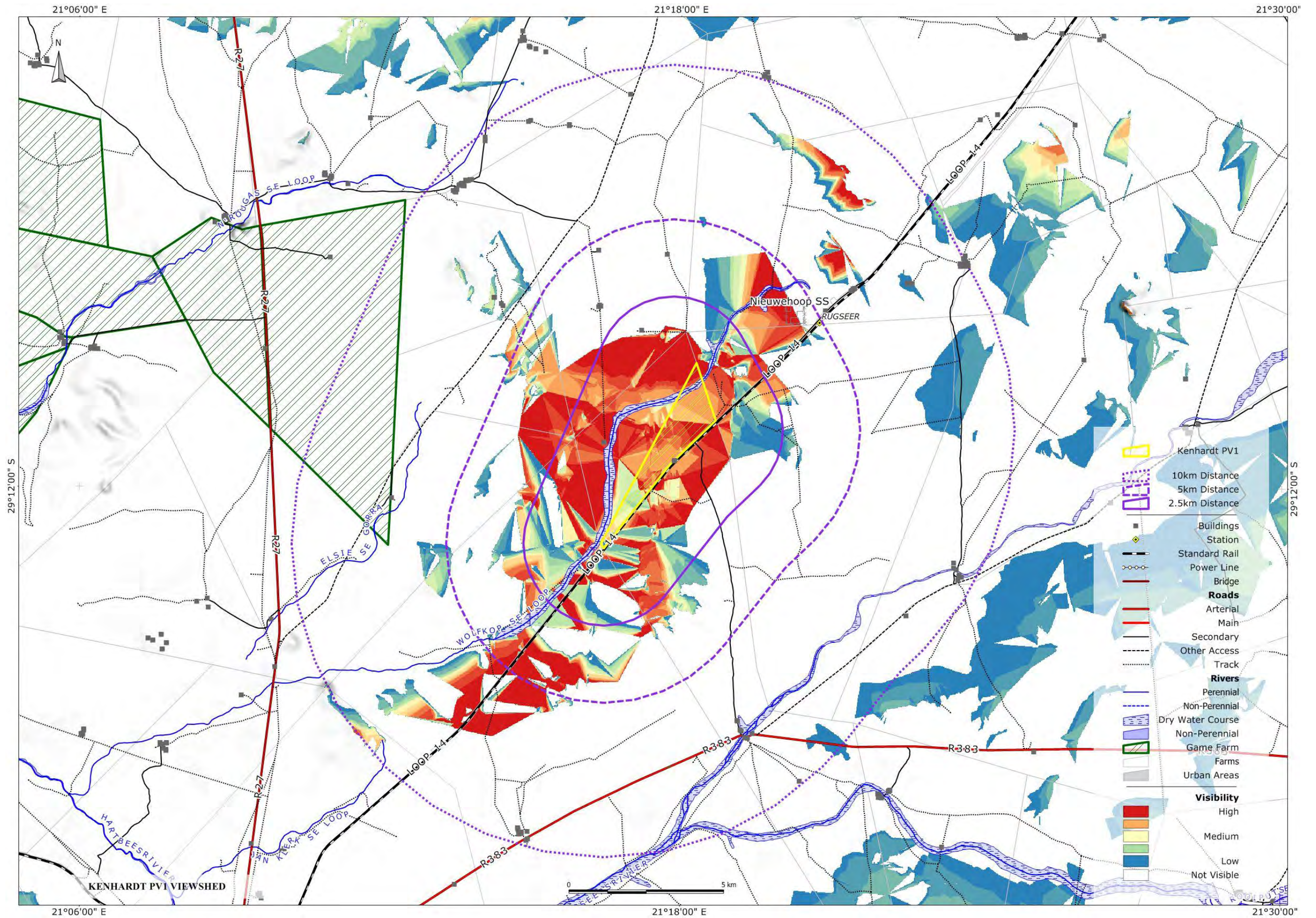
Map 4: Simplified geology of the region.



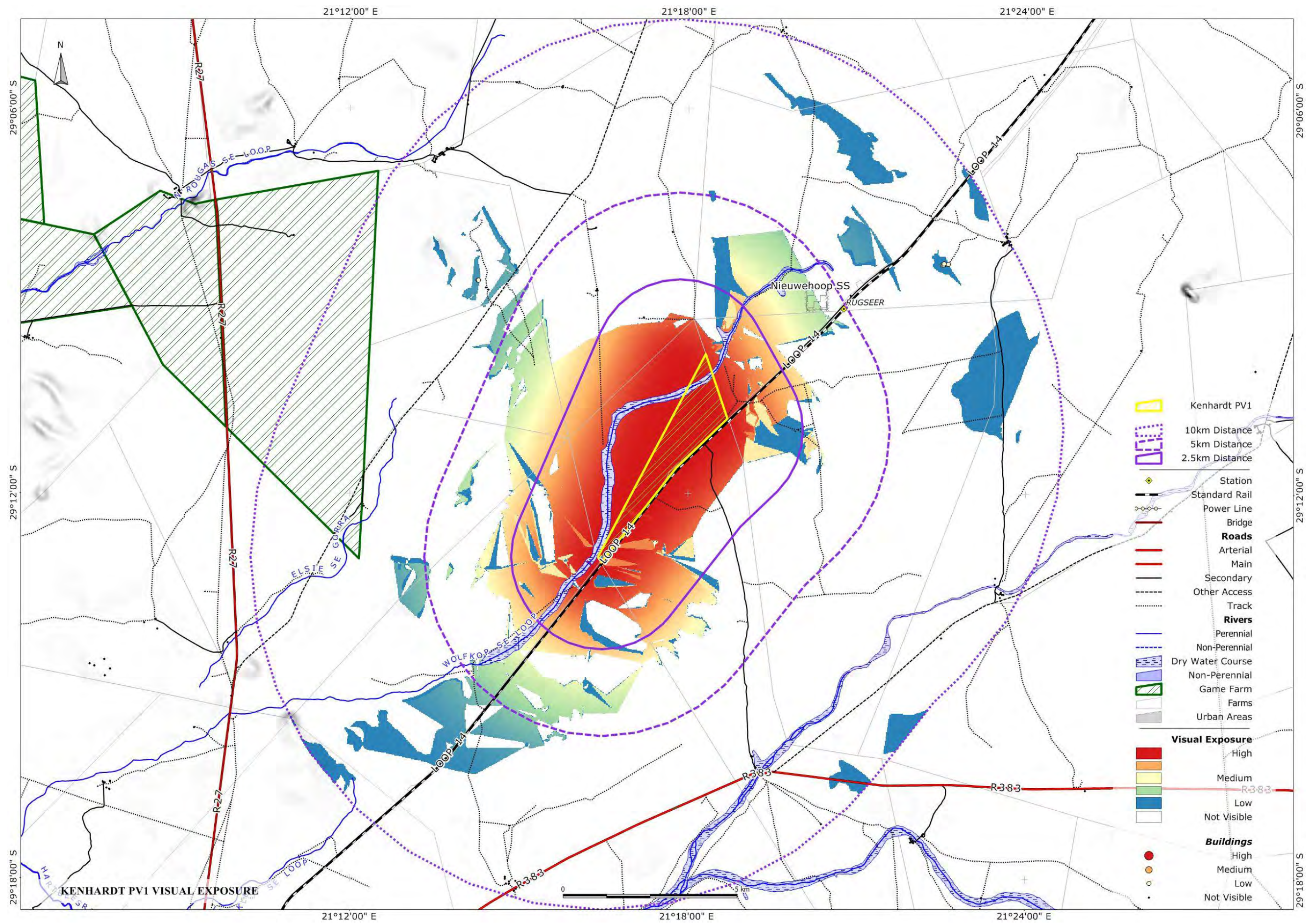
Map 5: Land cover map of the region.



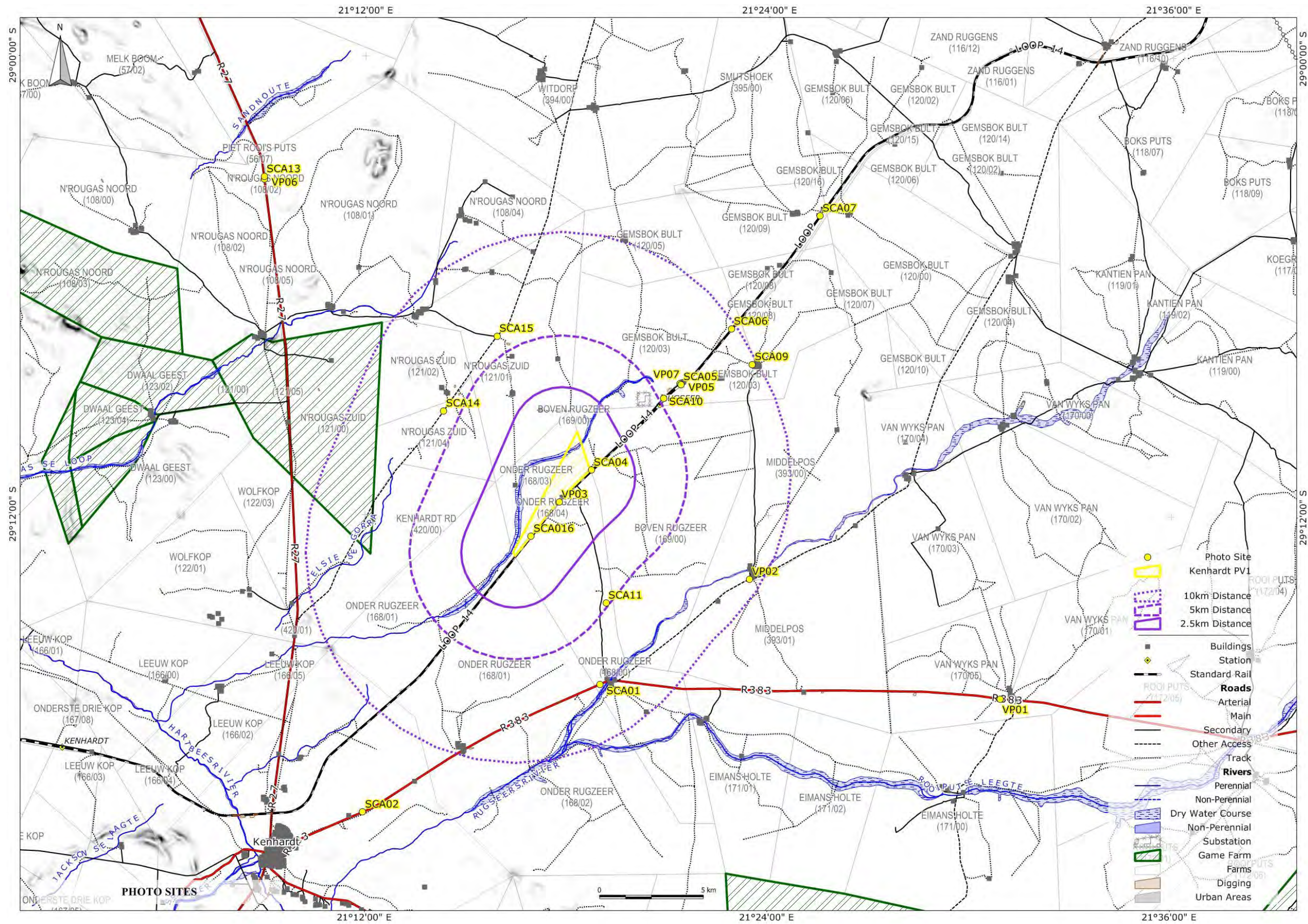
Map 6: Prominent man-made structures and settlement patterns in the landscape.



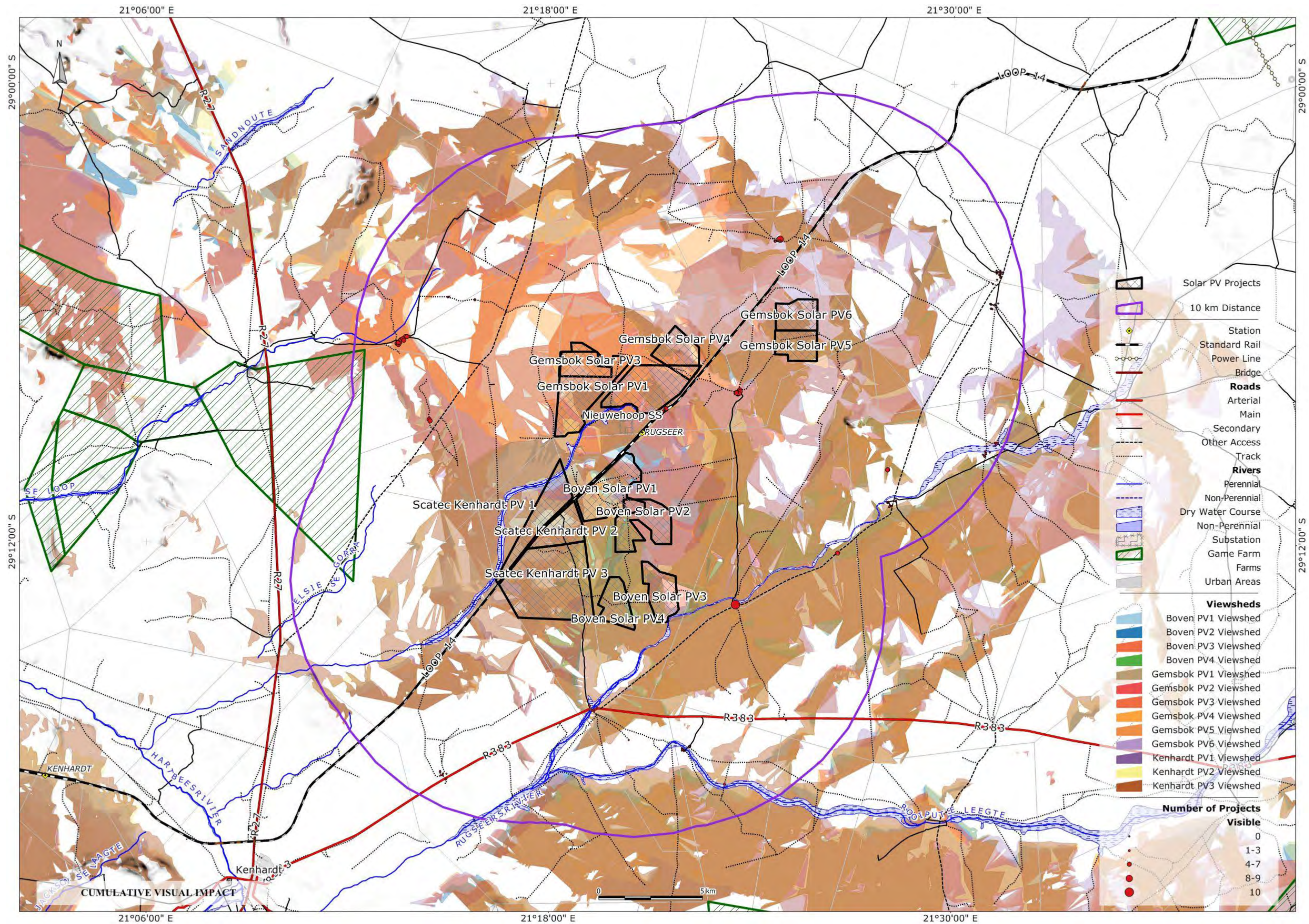
Map 7: Viewshed of the proposed Kenhardt PV 1 facility.



Map 8: Visual exposure for sensitive visual receptors within 10 km of the development.



Map 9: Sites visited during photographic survey (SCA - October 2015; VP - June 2014)



Map 10: 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).



# EIA REPORT



## CHAPTER 9:

# Heritage Impact Assessment (Archaeology and Cultural Landscape)

**Scoping and Environmental Impact  
Assessment** for the Proposed  
Development of a 75 MW Solar  
Photovoltaic Facility (KENHARDT PV 1)  
on the remaining extent of Onder Rugzeer  
Farm 168, north-east of Kenhardt,  
Northern Cape Province

*Report prepared for:*

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April 2016

## 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-	Section 9.1.4 and Appendix 9.1 of this chapter and Appendix A of the EIA Report
a) details of- <ul style="list-style-type: none"> <li>i. the specialist who prepared the report; and</li> <li>ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;</li> </ul>	Section 9.1.4 and Appendix 9.1 of this chapter and Appendix A of the EIA Report
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 9.1.5 and Appendix 9.2 of this chapter and Appendix B of the EIA Report
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 9.1.3
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 9.3.2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 9.3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 9.1.1
g) an identification of any areas to be avoided, including buffers;	Sections 9.7, 9.11 & 9.13
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 9.8
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 9.3.5
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;	Sections 9.7 & 9.8
k) any mitigation measures for inclusion in the EMPr;	Sections 9.7, 9.8 & 9.9
l) any conditions for inclusion in the environmental authorisation;	Section 9.13
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9.11
n) a reasoned opinion- <ul style="list-style-type: none"> <li>i. as to whether the proposed activity or portions thereof should be authorised; and</li> <li>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;</li> </ul>	Sections 9.12 & 9.13
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 9.3.6
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 9.3.6
q) any other information requested by the competent authority.	Not applicable

# list of abbreviations

<b>ASAPA</b>	Association of Southern African Professional Archaeologists
<b>CCS</b>	Crypto-crystalline Silica
<b>CRM</b>	Cultural Resources Management
<b>CSIR</b>	Council for Scientific and Industrial Research
<b>EIA</b>	Environmental Impact Assessment
<b>EMPr</b>	Environmental Management Programme
<b>ESA</b>	Early Stone Age
<b>GPS</b>	Global Positioning System
<b>HIA</b>	Heritage Impact Assessment
<b>LSA</b>	Later Stone Age
<b>MSA</b>	Middle Stone Age
<b>NEMA</b>	National Environmental Management Act (No. 107 of 1998)
<b>NHRA</b>	National Heritage Resources Act (No. 25) of 1999
<b>PPP</b>	Public Participation Process
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SAHRIS</b>	South African Heritage Resources Information System

## glossary

<i>Definitions</i>	
<b>Background Scatter</b>	Artefacts whose spatial position is conditioned more by natural forces than by human agency.
<b>Early Stone Age</b>	Period of the Stone Age extending approximately between 2 million and 200 000 years ago.
<b>Hand-axe</b>	A bifacially flaked, pointed stone tool type typical of the Early Stone Age.
<b>Holocene</b>	The geological period spanning the last approximately 10-12 000 years.
<b>Hominin</b>	a group consisting of modern humans, extinct species of humans and all their immediate ancestors.
<b>Later Stone Age</b>	Period of the Stone Age extending over the last approximately 20 000 years.
<b>Middle Stone Age</b>	Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

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## 9 HERITAGE IMPACT ASSESSMENT

Please note that this chapter (forming part of the finalised EIA Report) is a reformatted version of the original, stand-alone Heritage Impact Assessment report which can be consulted online on the South African Heritage Resources Information System.

### 9.1 INTRODUCTION

ASHA Consulting (Pty) Ltd (ASHA) was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction, operation and decommissioning of the 75 Megawatt (MW) Kenhardt PV 1 solar energy facility on the remainder of farm Onder Rugzeer 168 (Figure 9.1). A 132 kV transmission line across the Remainder of Boven Rugzeer 169 and Portion 4 of Onder Rugzeer 168 will link the facility with the Eskom Nieuwehoop Substation presently under construction on Gembok Bult 120/3. As noted in Chapter 1 of the EIA Report, this power line has been assessed in a separate Basic Assessment process. This specialist study only assesses the potential impacts of the Kenhardt PV 1 project (in terms of the preferred site).

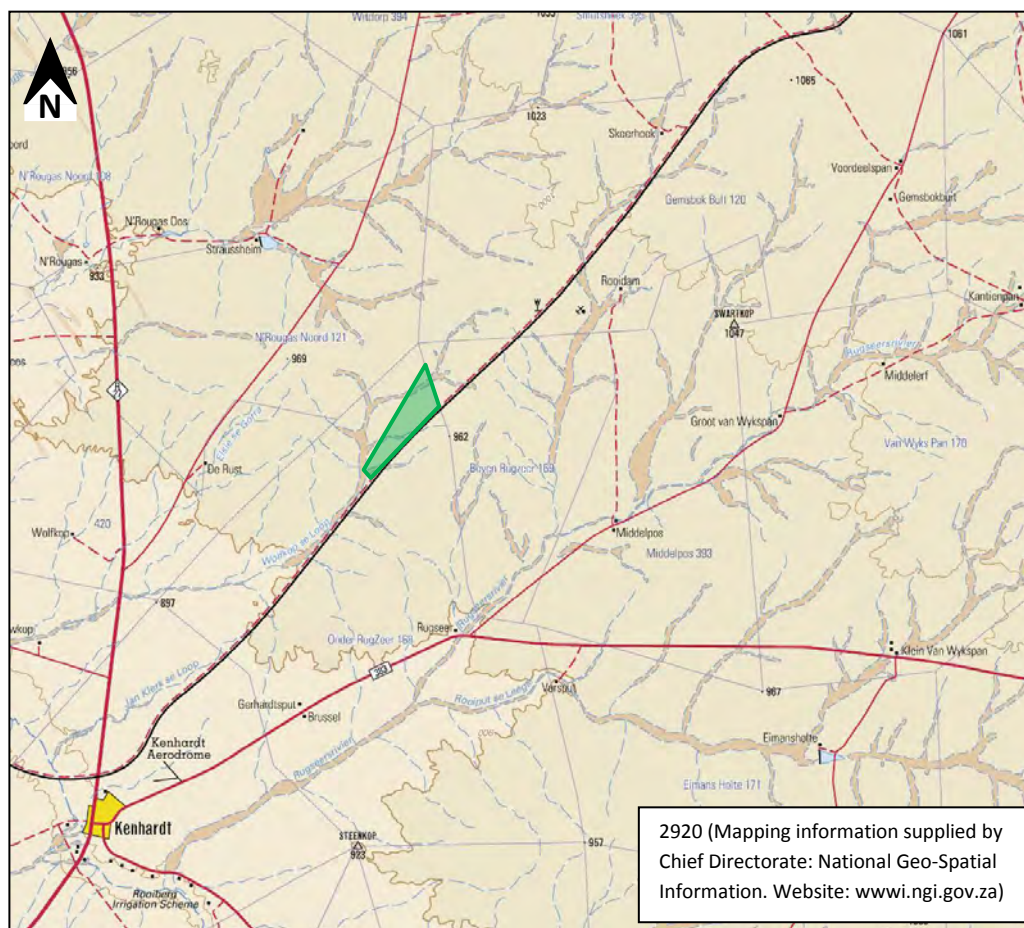


Figure 9.1: Map showing the location of the site (green polygon).



### 9.1.1 Project Description

This project, referred to as Kenhardt PV 1, is one of three proposed on the same land parcel (Figure 9.2). It will entail construction of the following main components:

- Solar arrays;
- Buildings (offices, operational and maintenance control centre, warehouse/workshop, ablution facilities and converter station);
- Electrical infrastructure (including a transmission line and substation);
- Access Road;
- Internal gravel roads;
- Fencing;
- Operation and maintenance area;
- Laydown area;
- Storm water channels; and
- Water pipelines, if required.

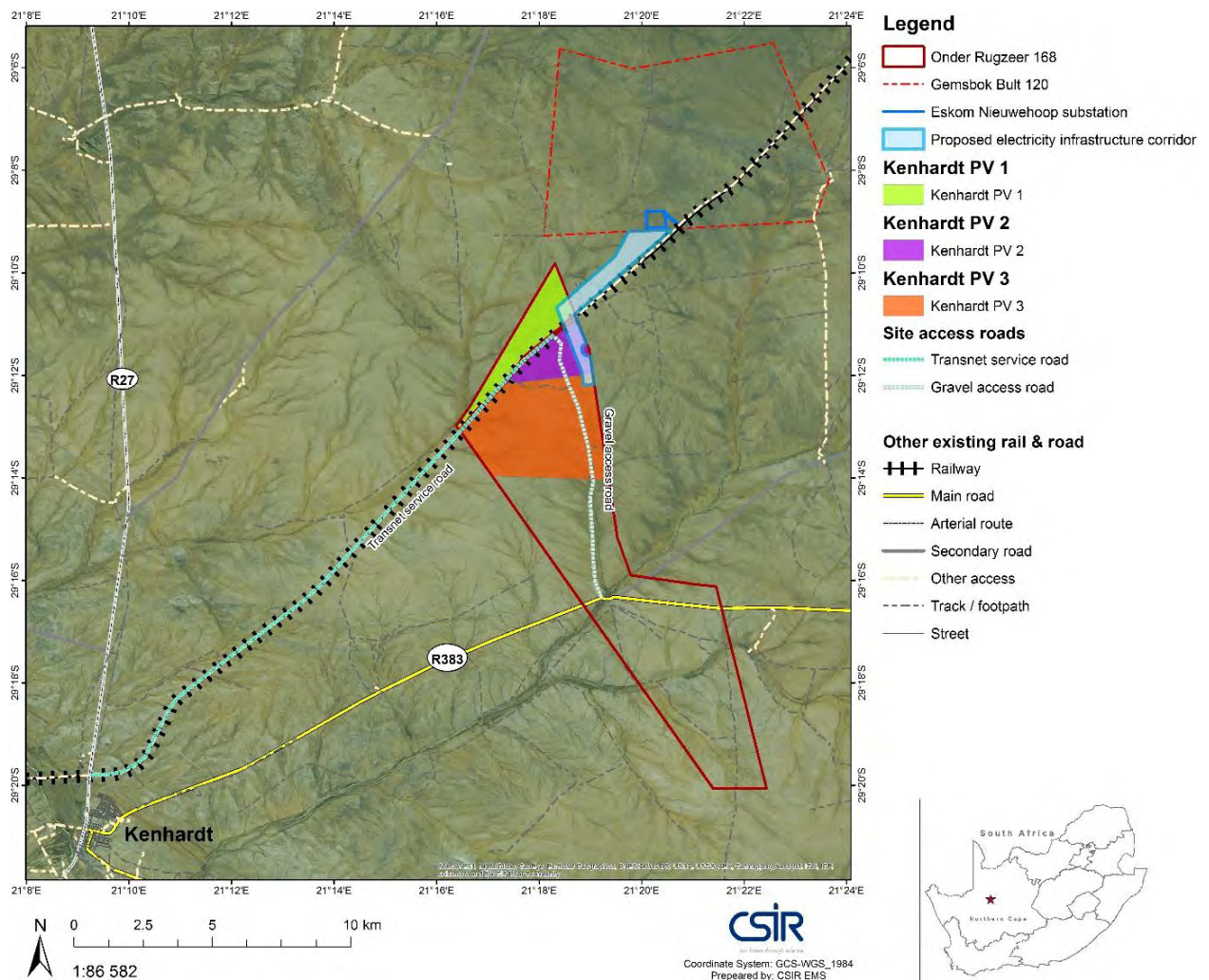


Figure 9.2: Map showing the location of the three proposed facilities. That assessed in the present report is shaded green.

Although the study area is some 485 ha in extent, the final constructed footprint of the facility will be approximately 250 ha. The developer will select the final layout area in such a way as to minimise impacts to the natural and cultural environment. A detailed project description is provided in Chapter 2 of the EIA Report.

A detailed description of the transmission line corridor is provided and assessed separately in the Basic Assessment for the Kenhardt PV 1 - Transmission Line project.

Any aspect of the development as proposed might have a negative impact on heritage resources and thus the entire project is relevant to the heritage assessment. Aspects that disturb the ground (e.g. foundations, roads, trenches) may affect archaeology, palaeontology and graves, while all superstructures (e.g. solar panels, buildings, fences) would introduce impacts to the cultural landscape.

### 9.1.2 Terms of Reference

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ASHA was requested to conduct a field study and produce a Heritage Impact Assessment (HIA) that would meet the requirements of the heritage authorities.

During the Scoping Phase the South African Heritage Resources Agency (SAHRA) was notified of the proposed development. They responded requesting an impact assessment that examined archaeology, palaeontology and other aspects of heritage as relevant.

The HIA was based on the following broad Terms of Reference:

- Describe the affected environment and determine the status quo in terms of its heritage sites, heritage features and archaeology.
- Undertake a desktop study on the archaeology, cultural landscape and heritage sites within the proposed project area. Highlight any gaps in the baseline data.
- Based on the project description, define the environmental risks to the archaeology and heritage features.
- Undertake a detailed field examination of the archaeological sites and heritage features within or in the region of the development area. Record sites of archaeological relevance (photos, maps, aerial or satellite images, Global Positioning System (GPS) co-ordinates, and stratigraphic columns).
- Provide a sensitivity map indicating the presence of sensitive areas, “no-go” areas, setbacks/buffers, as well as the identification of red flags or risks associated with heritage and archaeological impacts.
- Evaluate the potential for occurrence of archaeological features within the study area.
- Identify relevant protocols, legal and permit requirements relating to heritage and archaeological impacts likely to be generated as a result of the proposed project.
- Identify and rate potential direct, indirect and cumulative impacts of the proposed project on the archaeological heritage during the construction, operational and decommissioning phases of the project.
- Comply with the requirements of the relevant heritage authority in order to obtain a letter of approval, in terms of the National Heritage Resources Act (Act 25 of 1999).
- Compile a report providing a review of heritage resources within the study area based on the desktop study and data from fieldwork and analysis.
- Provide input to the EMPr, including mitigation and monitoring requirements to ensure that the impacts on the archaeological features and heritage features are limited. Provide recommendations and suggest appropriate mitigation measures (if required), for the recording, sampling and dating of any archaeological sites that could potentially be destroyed as a result of the proposed project.

### 9.1.3 Scope and Purpose of the Report

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An HIA is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued for consideration by the National Department of Environmental Affairs (DEA) who will review the EIA and grant or withhold authorisation. The HIA report will outline any mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

### 9.1.4 The Author

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting HIAs and archaeological specialist studies in the Western Cape and Northern Cape provinces of South Africa since 2004 (Please refer to the Curriculum Vitae included in Appendix 9.1 of this chapter, as well as Appendix A of the EIA Report). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is accredited with the Association of Southern African Professional Archaeologists (ASAPA) Cultural Resources Management (CRM) section (Member #233) as follows:


- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

### 9.1.5 Declaration of Independence

The declaration of independence by the specialist is provided below with a full declaration included in Appendix 9.2 of this HIA Report chapter, as well as Appendix B of the EIA Report.

#### DECLARATION OF INDEPENDENCE

I, Dr Jayson Orton, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Kenhardt PV 1 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.



JAYSON ORTON

## 9.2 HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: “any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith”;
- Palaeontological material: “any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace”;
- Archaeological material: a) “material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures”; b) “rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation”; c) “wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in

South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation”; and d) “features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found”;

- Grave: “means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place”; and
- Public monuments and memorials: “all monuments and memorials a) “erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

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; some of these speak directly to cultural landscapes.

Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. This report fulfils that requirement.

Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape; for built environment and cultural landscapes) and SAHRA (for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the DEA. Comments from SAHRA are included in Chapter 6 of the finalised EIA Report, with corresponding responses.

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## 9.3 METHODS

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### 9.3.1 Literature Survey and Information Sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:250 000 map was sourced from the Chief Directorate: National Geo-Spatial Information.

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### 9.3.2 Field Survey

The three Kenhardt PV projects and their alternative site locations were assessed together in the field on 28 to 31 October 2015. This was during late Spring, although in this dry area seasonality has no effect on the visibility of heritage resources - visibility was excellent. The survey did not aim to be comprehensive - that would have taken many weeks - but rather sought to conduct a landscape survey where certain landscape features known to be more sensitive were located and searched. Nevertheless, transects through all areas of the site were carried out to ensure that consistent results were being obtained and that the survey methodology was reliable. During the survey, the positions of finds were recorded on a hand-held GPS receiver set to the WGS84 datum. Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

The survey was conducted by the author in the company of Mr Matthew Shaw, an archaeology Masters student.

The Kenhardt PV 1 (preferred) site and Kenhardt PV 1b (alternative) site were both surveyed, however, as noted above, this specialist study only assesses the potential impacts related to the preferred site. Furthermore, the final layout of the proposed facility will only occupy 250 ha of this preferred site with the development area being chosen to avoid as many sensitive features as possible.

### 9.3.3 Impact Assessment

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For consistency, the impact assessment was conducted through application of a scale supplied by the CSIR as shown in Chapter 4 of the EIA Report.

### 9.3.4 Grading

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Section 7 of the NHRA provides for the grading of heritage resources into those of National (Grade 1), Provincial (Grade 2) and Local (Grade 3) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade 1 and 2 resources are intended to be managed by the national and provincial heritage resources authorities, while Grade 3 resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. Heritage Western Cape (2012), however, uses a system in which resources of local significance are divided into Grade 3A, 3B and 3C. These approximately equate to high, medium and medium-low local significance, while sites of low or very low significance (and generally not requiring mitigation or other interventions) are referred to as ungradeable. For convenience, the Heritage Western Cape system is employed here.

### 9.3.5 Assumptions and Limitations

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The study is carried out at the surface only and hence any completely buried archaeological sites will not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. Given the nature of the surface geology, neither of these limitations are likely to have affected the outcome of the report.

With regards to cumulative impacts, various other solar energy facilities and electrical transmission lines have been proposed in the immediate area. A new substation is presently under construction and three solar energy facilities have received positive Environmental Authorisations, although it is unknown when/if they will be built. The full list of developments considered in the cumulative impact assessment is provided in Chapter 4 of the EIA Report.

### 9.3.6 Consultation Processes Undertaken

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The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA.

## 9.4 PHYSICAL ENVIRONMENTAL CONTEXT

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### 9.4.1 Site Context

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The PV 1 site is located in a remote area some 20 km northeast of Kenhardt. It is located to the north of the Sishen-Saldanha Railway Line and its gravel service road. Although major power lines are not currently present in the area, a large substation is currently under construction approximately 4.5 km to the northeast of the site - this is the Eskom Nieuwehoop Substation (Figure 9.3). Three other PV facilities have already been granted authorisation in close proximity to the substation setting a precedent for electrical development in the area. The land is otherwise generally undeveloped and used for small stock grazing. Farm tracks and fences criss-cross the general area and occasional wind pumps occur.



Figure 9.3: View towards the northeast (from the PV 1 site just north of the railway line) of the Nieuwehoop Substation currently under construction.

### 9.4.2 Site Description

The site is generally quite flat with occasional very low rocky outcrops. The vegetation is sparse and largely less than knee-high; trees are rare. The surface is coated mostly with fine gravel which is a product of the weathering bedrock. Very ephemeral stream beds cross the site, but these are generally only evident because of the elevated vegetation density and slightly larger bushes along their alignments. Because all three sites adjoin one another and were assessed together, the photographs in Figures 9.4 to 9.7 show examples of the landscape in the broader study area across the remainder of Onder Rugzeer 168.



Figure 9.4: View of an ephemeral stream bed with its slightly elevated vegetation density.



Figure 9.5: Example of overgrazed land with very sparse vegetation.



Figure 9.6: Example of gravel surface and one of the few trees in the study area.

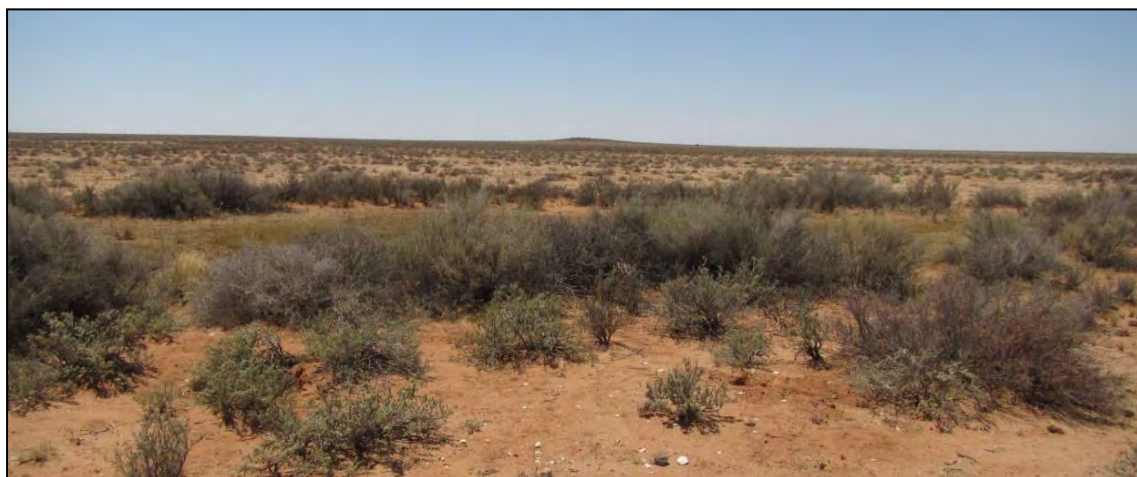


Figure 9.7: View of a small pan in the PV 2 section of the study area (which is assessed in the separate Kenhardt PV 2 report).

## 9.5 CULTURAL HERITAGE CONTEXT

This section of the HIA contains the desktop study and establishes what is already known about heritage resources in the vicinity of the study area. What was found during the field survey as presented below may then be compared with what is already known in order to gain an improved understanding of the significance of the newly reported resources.

### 9.5.1 Archaeological Aspects

Bushmanland is well known for the vast expanses of gravel that occur in places and which frequently contain stone artefacts in varying densities (Beaumont et. al 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 immediately east of the present site 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 to the east of the present study area in association with pans but artefact scatters associated with drainage lines were rare (Orton 2014a, 2014b, 2014c). The drainage lines on the present site, however, are more prominent and perhaps more likely to reveal LSA camp sites. 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. Similar LSA sites can also be found in association with rocky outcrops but none appear to occur within the present study area. 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. Despite the increased likelihood of locating archaeology along streams, Morris (2009) noted that a search along the banks of the Hartbees River close to Kenhardt, where he expected elevated frequencies of archaeological material, revealed virtually nothing.

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).

Rock engravings are known from the broader area (Louw Roux Bushmanland 2013). From the limited information available, these appear to be naturalistic images produced by the Bushmen. Geometric images, produced by the Khoekhoen, are not well known from the area (Orton 2013), although David Morris (pers.

comm. 2015) has seen examples in the region. Painted art is also very rare but again, examples are known, particularly on large granite boulders.

### 9.5.2 Historical Aspects

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The Anglo-Boer War was fought across the Northern Cape, but information on the role of Kenhardt appears difficult to locate. The town was occupied by the Boers in late February 1900 after they convinced the magistrate that they had a large gun and would fire on the town if it did not surrender. They later surrendered to the British who occupied the town on 31<sup>st</sup> March 1900. By mid-1900 there were perhaps 100 Cape Rebels detained in a camp outside of Kenhardt (Grobler 2004). The British raised a local force known as the Border Scouts in Upington in May 1900. Many were mixed-race individuals, some local farmers, others Kalahari hunters, but all disliked the Boers. The scouts were responsible for a large area of the north-western Cape Colony centred on Upington and Kenhardt. They eventually numbered 786 by January 1901 and were under the command of Major John Birbeck (AngloBoerWar.com 2015; Rodgers 2011). At the beginning of 1902 there were 150 Border Scouts stationed at Kenhardt. Two boers, H.L. Jacobs and A.C. Jooste, were accused of treason and executed in the town on 24 July 1901 (Grobler 2004). A memorial stands there to their honour (Green Kalahari n.d.).

No major action appears to have taken place around Kenhardt, although the Boers are known to have attacked a patrol on 17<sup>th</sup> May 1901, while the British attacked a Boer position on 25<sup>th</sup> June 1901 (AngloBoerWar.com 2015).

### 9.5.3 Built Environment

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The built environment is sparsely represented in Bushmanland because the farms tend to be so large. The vast majority of structures appear to be quite recent in age (20<sup>th</sup> century) and are of very limited heritage significance. In any case, the development will not affect any buildings.

### 9.5.4 Graves

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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.

### 9.5.5 Other Aspects

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The cultural and natural landscape is also of concern. However, 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. In addition, the proposed site is a long distance from any important roads (it is 11 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. Solar PV facilities are not very tall and, if an earthy coloured paint is used for the buildings, they can be almost invisible from as little as 1 km away.

## 9.6 IDENTIFICATION OF KEY ISSUES

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### 9.6.1 Key Issues Identified During the Scoping Phase

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Only one potentially significant heritage issue was identified during the Scoping Phase of this EIA Process. This was:

- The potential damage to or destruction of Stone Age archaeological sites occurring in proximity to water courses and pans.



The following comment was also received from SAHRA on 22 September 2015 (via SAHRIS) based on their review of the Background Information Document. It is important to note that only the points relating to Archaeology and Heritage aspects have been extracted from the SAHRA comment and reproduced below:

*In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that prior to development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.*

*The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists [www.asapa.org.za](http://www.asapa.org.za)) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.*

*The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.*

*Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.*

The present HIA meets the requirements of SAHRA in that it aims to satisfy Section 38(3) of the NHRA, the author is an appropriately accredited CRM Section member of ASAPA and recommendations for further studies as may be required are presented.

Additional comments from SAHRA were received on 5 April 2016 during the 30-day review of the EIA Report via SAHRIS. Responses to these comments are included in Chapter 6 of the finalised EIA Report.

### **9.6.2 Sensitivity of the site in relation to proposed activity**

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The site is sensitive for the many archaeological artefacts and sites on its surface that would be damaged or destroyed through construction related activities. These include site preparation and all works related to installation of the project components.

### **9.6.3 Identification of Potential Impacts**

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The potential impacts identified during the EIA Phase are:

#### **9.6.3.1 Construction Phase**

- Damage to or destruction of archaeological resources;
- Damage to or destruction of graves; and
- Impacts to the cultural and natural landscape.

#### **9.6.3.2 Operational Phase**

- Impacts to the cultural and natural landscape.

#### **9.6.3.3 Decommissioning Phase**

- Impacts to the cultural and natural landscape.

### 9.6.3.4 Cumulative Impacts

- Damage to or destruction of archaeological resources;
- Damage to or destruction of graves; and
- Impacts to the cultural and natural landscape.

## 9.7 FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. Besides the landscape itself, all are archaeological in nature and comprise largely of Stone Age remains. These are listed in Table 9.1 and mapped in Figure 9.8.

**Table 9.1: List of archaeological resources found during the survey. Note that, even though the alternative site is not formally assessed here, the resources found are still listed for the record. Where the PV number appears in brackets this indicates that the resource is close to but not actually within the footprint area. A number of hours under mitigation is the suggested time required to carry out mitigation excavations.**

PV	Waypoint	Co-ordinates	Description	Heritage Significance	Suggested Mitigation
1	201	S29 12 06.7 E21 17 01.7	Flaked quartz outcrop with a few artefacts around it.	Low	
1	202	S29 11 18.4 E21 17 37.9	Flaked quartz outcrop with a few artefacts around it.	Low	
1	204	S29 10 47.0 E21 18 13.8	Flaked quartz outcrop with a few artefacts around it.	Low	
1	209	S29 12 18.6 E21 16 45.9	Flaked quartz outcrop with a few artefacts around it.	Low	
1	723	S29 12 07.6 E21 17 14.9	Flaked quartz outcrop with a few artefacts around it.	Low	
1	724	S29 12 32.3 E21 16 55.0	Large flaked quartz outcrop with a few artefacts around it.	Low	
1	725	S29 11 55.6 E21 17 17.0	Large flaked quartz outcrop with a few flakes around it. Situated on a large, low rise covered in quartz gravel.	Low	
1	742	S29 12 26.8 E21 16 47.4	Likely grave. Rock slab planted on end deeply into the ground. It could not be moved. The slab is perfectly vertical, while exposed bedrock is generally dipping. It is in a sandy area with no other rocks present in the vicinity. It faces southwest/northeast.	High	Avoid with a buffer of at least 5 m or test excavate to check for human remains and then make a decision to avoid or exhume in line with required process.
1B	214	S29 14 10.4 E21 19 18.1	Patch of quartz cobbles with artefacts scattered in between.	Low	
1B	215	S29 14 18.2 E21 19 10.9	Flaked quartz outcrop with a few artefacts around it.	Low	
1B	216	S29 14 26.7 E21 19 12.2	Flaked quartz outcrop with a few artefacts around it.	Low	
1B	232	S29 14 02.2 E21 17 36.9	Scatter of diagnostic quartz artefacts about 50 m south of small pan. There appears to be a generally elevated density of quartz background scatter all around the pan, except to the northwest where the surface is coated in calcrete gravel.	Low	
1B	233	S29 14 00.8 E21 17 37.8	LSA scatter of quartz, quartzite and cryptocrystalline silica (CCS) spread around southern edge of pan.	Medium	Avoid with a buffer of at least 40 m from the centre of the pan or conduct archaeological excavations to rescue artefacts and data (4

Scoping and Environmental Impact Assessment for the proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

PV	Waypoint	Co-ordinates	Description	Heritage Significance	Suggested Mitigation
					hours).
1B	750	S29 14 45.3 E21 19 06.0	Ephemeral LSA scatter of quartz and ostrich eggshell located on the river terrace.	Low	
1B	759	S29 14 21.2 E21 18 41.2	Flaked quartz outcrop with a few artefacts around it.	Low	
1B	760	S29 14 34.5 E21 18 27.4	Large, dense quartz scatter with eight clusters. Presumably Holocene LSA, although no diagnostic artefacts or organic materials were seen. One quartzite cobble that might have been a hammer stone was present, as was a split quartzite cobble. Eight waypoints were taken for the scatters at this site but only the middlemost one is provided here.	Medium	Avoid with a buffer of at least 75 m from GPS point or conduct archaeological excavations to rescue artefacts and data (24 hours).
1B	761	S29 14 35.4 E21 18 31.9	Small LSA scatter of quartz with some ostrich eggshell and one bone fragment.	Low	
1B	762	S29 14 42.9 E21 18 27.8	Flaked quartz outcrop with a few artefacts around it.	Low	
1B	766	S29 14 04.2 E21 18 18.5	Flaked quartz outcrop with a few artefacts around it.	Low	
1B	767	S29 14 00.1 E21 17 21.7	Flaked quartz outcrop with a few artefacts around it.	Low	
(1B)	749	S29 14 46.7 E21 19 06.4	Ephemeral LSA scatter of quartz and ostrich eggshell located on the river terrace.	Low	
(1B)	219	S29 14 44.9 E21 18 01.5	Flaked quartz outcrop with a few artefacts around it.	Low	
(1B)	234	S29 14 00.2 E21 17 37.2	Light LSA scatter of quartz, quartzite, CCS and silcrete located in the sandy outflow area of the pan (northwest side).	Medium	Avoid with a buffer of at least 40 m from the centre of the pan or conduct archaeological excavations to rescue artefacts and data (4 hours).

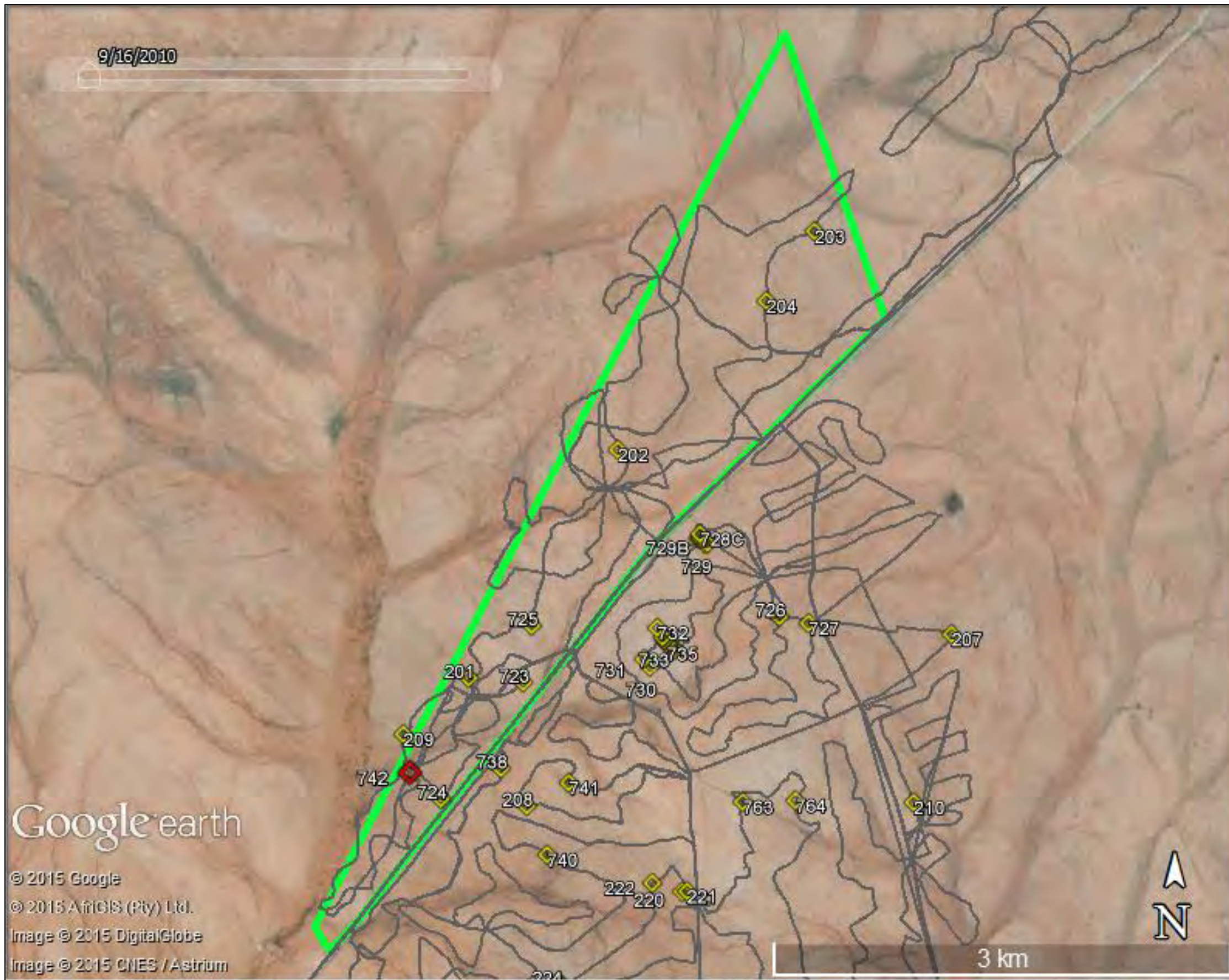


Figure 9.8: Aerial view of the PV 1 study area (green) with waypoints (numbered symbols) and tracks (grey lines) indicated. The one significant heritage site in PV 1 is highlighted in red. Waypoints and tracks to the south lie in the PV 2 and PV 3 study area.

### 9.7.1 Archaeological Resources

The most common type of archaeological site encountered in the study area was quartz quarries (Figure 9.9). These are natural outcrops of quartz that have been struck in order to remove flakes from them for use elsewhere. They generally have some artefacts scattered around them as well. Aside from these outcrops, the only other material noted was scattered isolated artefacts referred to as background scatter and that effectively constitute Stone Age litter. Because of their very low density across the landscape they have little significance. Some of these artefacts are age diagnostic and can thus give an indication of the length of time during which hominins have been using the landscape. However, the majority cannot provide much information at all (e.g. Figure 9.10).



Figure 9.9: View of one of the larger flaked quartz outcrops in the study area (waypoint 725).



Figure 9.10: A quartz core of uncertain age found in the PV1 study area. It is about 90 mm across.

Although not described and assessed further in this report, it is noted that the survey of the alternative site yielded more significant archaeological remains and that these were generally associated with streams.

### 9.7.2 Graves

Graves can be very difficult to identify because they are usually not visible from more than a few meters away. Only one likely grave was located within the PV 1 study area (waypoint 742). It was a single slab of rock that was deeply planted in a sandy area (Figure 9.11). The origins of such graves are difficult to pin-point, but the most likely source of graves is from trekboers who spent time in the area. An alternative could be that the graves represent people who died during the second Anglo-Boer War, but since no major action was reported from the area this seems the less likely interpretation.



Figure 9.11: The likely grave in the south-western part of the PV 1 study area (waypoint 742).

### 9.7.3 Cultural and Natural Landscape

The cultural landscape is rather weakly developed and relates to the keeping of small stock in the region. The landscape is characterised by wide open space with occasional fence lines, farm tracks and wind pumps. The area is likely to have been used historically by trekboers until the early 1880s when the farms in the area were surveyed and allocated to individuals. Onder Rugzeer was surveyed in 1883. In the vicinity of the study area, the landscape is compromised by the presence of the railway line and substation.

### 9.7.4 Statement of Significance

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

The archaeological resources are deemed to have low cultural significance for their scientific value, graves are deemed to have high cultural significance for their social value, while the landscape has low cultural significance for its aesthetic and historical value.

### 9.7.5 Summary of heritage indicators and provisional grading

Although the potential for human remains means that possible grave sites should be regarded as significant, the nature of the site in the PV 1 study area suggests that a 3C grading is appropriate (i.e. medium-low local significance). The archaeological remains and cultural landscape have low significance and are considered ungradeable.

## 9.8 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

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### 9.8.1 *Damage to and Destruction of Archaeological Resources (Construction Phase)*

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The potential impact of damage to and destruction of archaeological resources is predicted to be a negative, direct impact. The impact is rated with a site specific spatial extent and a permanent duration. The consequence and probability of the impact are respectively rated as slight and unlikely (although note that the probability relates to the probability of impacting significant archaeological resources since it is guaranteed that archaeological resources will be directly impacted). The reversibility of the impact and irreplaceability of the resource are respectively rated as non-reversible and high. It is anticipated that any archaeological sites located within the final development footprint would be physically damaged or, more likely, destroyed when the surface is levelled in preparation for construction. Because of the low cultural significance of the sites found within the proposed development area, the significance of any impacts is likely to be very low. Mitigation is not suggested because none of the sites warrants such action. It should, however, be ensured that all works take place within the authorised footprint so as to avoid impacts to any nearby archaeological sites.

### 9.8.2 *Damage to and Destruction of Graves (Construction Phase)*

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It is anticipated that any graves located within the final development footprint would be physically damaged or possibly even destroyed when the surface is levelled in preparation for construction. Graves have high cultural significance and it is best to avoid them with a buffer of at least 5 m. The feature (shown in Figure 9.11 (waypoint 742)) is likely to be a grave and the impact significance before mitigation is rated as high. This potential impact is predicted to be a negative, direct impact, with a site specific spatial extent and a permanent duration. The consequence and probability of the impact are respectively rated as extreme and likely. The reversibility of the impact and irreplaceability of the resource are respectively rated as non-reversible and high.

In terms of mitigation, in the event that any graves or potential graves cannot be avoided with a buffer of at least 5 m then an archaeologist should be contracted to conduct a test excavation to determine the status of the feature. If it is determined to be a grave, then exhumation would need to occur with the permission of SAHRA. With mitigation the impact significance would be reduced to very low. It should also be ensured that all works take place within the authorised footprint so as to avoid impacts to any nearby graves.

### 9.8.3 *Impacts to the Natural and Cultural Landscape (Construction, Operational and Decommissioning Phases)*

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The impact of the proposed project on the natural and cultural landscape is expected to occur during the construction, operational and decommissioning phases. These potential impacts are predicted to be negative and direct, with a local spatial extent, and a long-term duration for the construction and operational phases and a short-term duration for the decommissioning phase. The consequence and probability of the impact are respectively rated as moderate and very likely. The reversibility of the impact and irreplaceability of the resource are respectively rated as high and moderate.

During the operational phase, the addition of solar panels to the landscape will result in a marked change in its character from a rural landscape to one characterized by electrical infrastructure. Given that the precedent has already been set for electrical development, the significance of these potential impacts is considered to be low. Solar panels are not as visible from a distance as the built aspects of the proposed development would be, but with the use of earthy-coloured paint on the buildings, the degree of visual intrusion would be slightly reduced but the impact significance is still rated as being low. No mitigation measures are recommended for the operational and decommissioning phases.

#### **9.8.4 Cumulative Impacts to Archaeological Resources**

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The development of multiple solar energy facilities will result in many archaeological artefacts and sites being disturbed and /or destroyed over a wide area. Few of the sites recorded in the region have high cultural significance and it is likely that the vast majority of those that do would be protected from harm because of their proximity to water courses and pans. Cumulative impacts would be negative and direct in nature. They would occur at the local level. The impacts would be permanent. Because no sites of high archaeological significance were found within the present study area, the cumulative impact consequence is rated as slight with the probability of impacts being unlikely. These combine to provide a significance rating of very low for this project. The impacts are irreversible and the irreplaceability of archaeological resources is high.

#### **9.8.5 Cumulative Impacts to Graves**

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The development of multiple solar energy facilities may result in a number of graves being disturbed and /or destroyed over a wide area. However, because graves can be very difficult to identify and many may well continue to exist beneath any developments, it is difficult to evaluate any cumulative impacts. The nature of graves as individual and generally isolated heritage resources is such that, although each is significant, the disturbance of multiple examples will not result in a significant cumulative impact. Cumulative impacts would be negative and direct and occur at the local level. They would be permanent in duration. The moderate consequence and likely probability combine to give an impact significance rating before mitigation of low. After mitigation it is expected to be very low. The mitigation measures include avoiding graves with a buffer of at least 5 m or testing via excavations to check for human remains. If any are located then exhumation would need to occur (in line with regulatory requirements).

#### **9.8.6 Cumulative Impacts to the Natural and Cultural Landscape**

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The development of multiple solar energy facilities will result in significant visual degradation of the local environment. However, it is also worth noting that it is far better, from the cumulative impact point of view, to cluster the facilities rather than to have them spread out over the landscape. The present application is one of a number of applications for solar energy facilities in close proximity to the Nieuwehoop Substation and, because of this clustering, the cumulative impacts are seen as acceptable. They would be direct negative impacts occurring at the local level and with long term duration. The consequence is rated as moderate and, although the impact is very likely to occur, the significance is rated as being low. Although mitigation is suggested (i.e. use earthy-coloured paint on built elements), this will not have much effect overall, therefore the post-mitigation significance is still rated as being low.

### **9.9 IMPACT ASSESSMENT SUMMARY**

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The assessment of potential impacts and recommendation of mitigation measures as discussed above are collated in Tables 9.2 to 9.5 below. Note that indirect impacts are not assessed because the nature of the identified heritage resources is such that significant indirect impacts are highly unlikely to occur



**Table 9.2: Impact assessment summary table for the Construction Phase**

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Con- sequence	Probability	Reversibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing of site	Destruction of archaeological resources	Negative	Site	Permanent	Slight	Unlikely	Non- reversible	High	Ensure all works occur inside the approved 250 ha development footprint.	Very low	Very low	5	High
Clearing of site	Destruction of graves	Negative	Site	Permanent	Extreme	Likely	Non- reversible	High	Avoid grave with a buffer of at least 5 m or test and exhume as required	High	Very low	5	Low
Clearing of site and constructio n of the proposed facility	Impacts to the natural and cultural landscape	Negative	Local	Long term	Moderate	Very likely	High	Moderate	Use earthy-coloured paint on built elements	Low	Low	4	High

**Table 9.3: Impact assessment summary table for the Operational Phase**

Operational Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Con- sequence	Probability	Reversibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The presence of the proposed PV facility	Impacts to the natural and cultural landscape	Negative	Local	Long term	Moderate	Very likely	High	Moderate	None required	Low	Low	4	High

**Table 9.4: Impact assessment summary table for the Decommissioning Phase**

Decommissioning Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Con- sequence	Probability	Reversibility of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
The presence of construction vehicles	Impacts to the natural and cultural landscape	Negative	Local	Short term	Moderate	Very likely	High	Moderate	None required	Low	Low	4	High

**Table 9.5: Cumulative impact assessment summary table**

Cumulative Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Con- sequence	Probability	Reversibi- lity of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Clearing of site	Destructio n of archaeolog ical resources	Negative	Local	Permanent	Slight	Unlikely	Non- reversible	High	None required	Very low	Very low	5	High
Clearing of site	Destructio n of graves	Negative	Local	Permanent	Moderate	Likely	Non- reversible	High	Avoid grave with a buffer of at least 5 m or test and exhume as required	Low	Very low	5	Low
Clearing of site and construction of the proposed facility	Impacts to the natural and cultural landscape	Negative	Local	Long term	Moderate	Very likely	High	Moderate	Use earthy-coloured paint on built elements	Low	Low	4	High

## 9.10 PERMIT REQUIREMENTS

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The NHRA does not require the developer to obtain permits prior to construction. However, any archaeological mitigation work (i.e. test excavations, sampling etc.) that may be required (in the event of archaeological resources or graves of significance being found within the development footprint during construction) would need to be conducted under a permit issued to, and in the name of, the appointed archaeologist. The permit application process allows the heritage authorities to ensure that a suitably qualified and experienced archaeologist undertakes the work and that the proposed excavation/sampling methodology is acceptable.

## 9.11 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

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### 9.11.1 For inclusion in the EMPr

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The Environmental Control Officer (ECO) (or Environmental Officer) should meet with workers on site at the start of the construction phase to explain the possibility that graves might be present. During clearing of the surface, all personnel should be vigilant for any unusual stone features and these should be reported to the ECO, who should then report the find(s) to an archaeologist. An alternative to this is to commission an archaeologist to conduct a more detailed examination of the surface of the final development footprint in order to identify any potential issues prior to construction. The feature(s) may need to be tested by an archaeologist to confirm whether they are graves or not. If they are graves then exhumation would be required prior to further work in the area.

Note that there are no specific heritage monitoring requirements for this project but that environmental monitoring by the ECO to ensure compliance with the recommendations has been included in the EMPr.

### 9.11.2 For inclusion in the Environmental Authorisation

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The following points should be included as conditions of authorisation:

- The potential grave should be avoided with a buffer of at least 5 m or else tested and, if necessary, exhumed prior to construction;
- The construction team should be made aware of the potential to locate more graves and instructed to report any suspicious stone features prior to disturbance;
- The built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

## 9.12 CONCLUSIONS

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Only one potentially significant heritage resource was identified - a possible grave (Figures 9.11 and 9.12). Aside from this, no other significant impacts are expected. The final 250 ha footprint may be located anywhere within the surveyed area, so long as the possible grave is either avoided or else tested and, if necessary, exhumed. Care should be taken to identify any further possible graves prior to the commencement of construction. Should these measures be complied with then no further significant impacts are expected and there is no heritage-related reason why the proposed development should not be allowed to proceed within the identified study area.



Figure 9.12: Aerial view of the PV 1 study area showing the single significant heritage site (red) in the south-western part.

### 9.13 RECOMMENDATIONS

Because the impacts are few and entirely manageable, it is recommended that the proposed project be allowed to continue but subject to the following conditions:

- The potential grave should be avoided with a buffer of at least 5 m or else tested and, if necessary, exhumed prior to construction;
- The construction team should be made aware of the potential to locate more graves and instructed to report any suspicious stone features prior to disturbance;
- The built elements of the facility should be painted in an earthy colour to minimise visual contrast in the landscape; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and

may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

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## APPENDIX 9.1 - Curriculum Vitae



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### Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science)	1997
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

\*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

### Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 - Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 - Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 - May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 - May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 - Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 - Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 -

### Memberships and affiliations:

South African Archaeological Society Council member	2004 -
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 -
ASAPA Cultural Resources Management Section member	2007 -
UCT Department of Archaeology Research Associate	2013 -
Heritage Western Cape APM Committee member	2013 -
UNISA Department of Archaeology and Anthropology Research Fellow	2014 -
Fish Hoek Valley Historical Association	2014 -

#### Professional Accreditation:

ASAPA membership number: 233, CRM Section member  
Principal Investigator: Coastal shell middens (awarded 2007)  
Stone Age archaeology (awarded 2007)  
Grave relocation (awarded 2014)  
Field Director: Rock art (awarded 2007)  
Colonial period archaeology (awarded 2007)

#### Fieldwork and project experience:

Extensive fieldwork as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

##### Phase 1 surveys and impact assessments:

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

##### Phase 2 mitigation and research excavations:

- ESA open sites
  - Duinefontein, Gouda
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

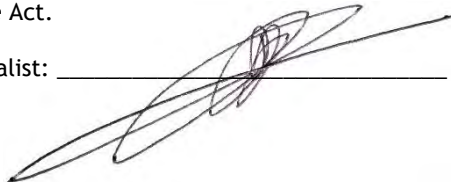


## APPENDIX 9.2 - Specialist Declaration

I, Jayson Orton, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: \_\_\_\_\_



Name of Specialist: JAYSON ORTON

Date: 28 DECEMBER 2015

# EIA REPORT



## CHAPTER 10:

# Desktop Palaeontological Impact Assessment

**Scoping and Environmental Impact Assessment** for the Proposed Development of a 75 MW Solar Photovoltaic Facility (KENHARDT PV 1) on the remaining extent of Onder Rugzeer Farm 168, north-east of Kenhardt, Northern Cape Province

*Report prepared for:*

CSIR - Environmental Management Services  
P O Box 17001  
Congella, Durban, 4013  
South Africa

*Report prepared by:*

Dr John Almond - Natura Viva cc  
P.O. Box 12410  
Mill Street, Cape Town, 8010  
South Africa

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April 2016

## 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 and Section 10.1.6 of this chapter
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 10.1.1
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Not Applicable
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 10.1.1 and 10.1.3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 10.1.3
g) an identification of any areas to be avoided, including buffers;	Not Applicable
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;	Section 10.3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 10.1.4
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 10.5, 10.6, 10.7 and 10.8
k) any mitigation measures for inclusion in the EMPr;	Section 10.7 and Section 10.8
l) any conditions for inclusion in the environmental authorisation;	Not Applicable
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 10.8
n) a reasoned opinion-	
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;	Section 10.9
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not Applicable
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 10.5.1
q) any other information requested by the competent authority.	Not applicable

# list of abbreviations

DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
Ma / mya	Million years ago

# glossary

<b>Definitions</b>	
<i>Basement Rocks</i>	Ancient igneous and metamorphic rocks (usually unfossiliferous) underlying the sedimentary cover rocks in a given region
<i>Calcrete</i>	Pedogenic limestone ( <i>i.e.</i> limestone generated by soil processes within soils and surface rock debris), generally associated with seasonally arid climates.
<i>Fossiliferous</i>	Containing fossil remains
<i>Igneous Rocks</i>	Rocks that have crystallised from a molten state (magma / lava); <i>e.g.</i> granite.
<i>Metamorphic</i>	Rocks that have recrystallized under conditions of altered (usually highly elevated) temperature and pressure; <i>e.g.</i> gneiss.
<i>Precambrian</i>	Older than 541 million years old (mya).
<i>Pleistocene Epoch</i>	Time period between c. 2.6 mya and 10 000 years ago (associated with a series of major glaciations in the northern hemisphere).

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## 10 DESKTOP PALAEOLOGICAL IMPACT ASSESSMENT

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This chapter presents the findings of the Palaeontological Impact Assessment that was prepared by Dr. John Almond (of Natura Viva cc) as part of the Environmental Impact Assessment (EIA) for the proposed Kenhardt PV 1 project within the Northern Cape Province.

### 10.1 INTRODUCTION AND METHODOLOGY

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#### 10.1.1 Scope and Objectives

---

The proposed Kenhardt PV 1 75 MW Solar Photovoltaic (PV) Facility project area overlies potentially fossiliferous sedimentary rocks. A desktop Palaeontological Impact Assessment - or at least a letter of exemption from a palaeontologist to indicate that this is unnecessary - has been requested by the South African Heritage Resources Agency (SAHRA) Archaeology, Palaeontology and Meteorites Unit for this development (Case ID: 8204, letter of September 22, 2015).

Linked to the above, this report provides a desktop assessment of potential impacts on local palaeontological (*i.e.* fossil) heritage within the study area for the proposed Kenhardt PV 1 75 MW Solar PV Facility on the remaining extent of Onder Rugzeer Farm 168, situated c. 20 km north-east of Kenhardt, Northern Cape Province. The report contributes to the EIA for this alternative energy development and includes recommendations for inclusion in the EMPr (Part B of the EIA Report).

The overall objectives of the specialist study 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 the proposed 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.
- Incorporate and address all issues and concerns raised in relation to palaeontological impacts.

#### 10.1.2 Terms of Reference

---

The Terms of Reference for the present study, as defined by the CSIR, are as follows:

1. Review detailed information relating to the project description and precisely define the environmental risks to palaeontological heritage, and consequences thereto.
2. Conduct a review of available information pertaining to the study area.
3. 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.
4. Prepare and undertake a desktop study on the palaeontology and fossil heritage within the proposed project area, based on:



- a review of all relevant palaeontological and geological literature, including geological maps and previous reports,
  - location and examination of fossil collections from the study area (e.g. museums), and
  - data on the proposed development (e.g. location of footprint, depth and volume of bedrock excavation envisaged).
5. Describe the type and location of known fossil heritage sites in the study area, and characterize all items that may be affected by the proposed project.
  6. Describe the baseline environment and determine the *status quo* in terms of palaeontological heritage.
  7. Note fossils and associated sedimentological features of palaeontological relevance (photos, maps, aerial or satellite images, and stratigraphic columns).
  8. Analyse the stratigraphy, age and depositional setting of fossil-bearing units.
  9. Evaluate the potential for occurrence of palaeontological heritage features within the study area.
  10. Incorporate relevant information from other specialist reports/findings, if required.
  11. Identify and rank the highlights and sensitivities to development of fossil heritage within study area.
  12. Identify and rate potential direct, indirect and cumulative impacts of the proposed project on the palaeontology and fossil heritage during the construction, operational and decommissioning phases of the project. Study the cumulative impacts of the project by considering the impacts of existing industries / solar PV plants within the area (as well as those PV plants that are proposed), together with the impact of the proposed project.
  13. Provide recommendations and suggestions regarding fossil heritage management on site, including conservation measures, as well as promotion of local fossil heritage (e.g. for public education, schools) to ensure that the impacts are limited.
  14. Provide input to the EMP, including mitigation and monitoring requirements to ensure that the impacts on the archaeological features and heritage features are limited.
  15. Provide specific recommendations for further palaeontological mitigation (if any).
  16. Compile an illustrated, fully-referenced review of palaeontological heritage within study area based on desktop study.

### 10.1.3 Approach and Methodology

---

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations etc.) represented within the study area are determined from geological maps and satellite images. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the author's field experience and palaeontological database (consultation with professional colleagues as well as examination of institutional fossil collections may play a role here). This data is then used to assess the palaeontological sensitivity of each rock unit to development (provisional tabulations of palaeontological sensitivity of all formations in the Western, Eastern and Northern Cape have already been compiled by J. Almond and colleagues (e.g. Almond & Pether 2008). The likely impact of the proposed development on local fossil heritage is then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned and (2) the nature and scale of the development itself, most significantly the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a Phase 1 field assessment study by a professional palaeontologist is usually warranted to identify any palaeontological hotspots and make specific recommendations for any mitigation required before or during the construction phase of the development. However, due to the low palaeontological sensitivity of the present study area a Phase 1 field assessment is not required and a desktop assessment is being undertaken instead (i.e. this study).

On the basis of the desktop and Phase 1 field assessment studies, the likely impact of the proposed development on local fossil heritage and any need for specialist mitigation are then determined. Adverse palaeontological impacts normally occur during the construction rather than the operational or decommissioning phase. Phase 2 mitigation by a professional palaeontologist -

normally involving the recording and sampling of fossil material and associated geological information (e.g. sedimentological data) may be required (a) in the pre-construction phase where important fossils are already exposed at or near the land surface and / or (b) during the construction phase when fresh fossiliferous bedrock has been exposed by excavations. To carry out mitigation, the palaeontologist involved will need to apply for a palaeontological collection permit from the relevant heritage management authorities for the Northern Cape, *i.e.* SAHRA (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000, Tel: 021 462 4502, Email: cscheermeyer@sahra.org.za). It should be emphasized that, providing appropriate mitigation is carried out, the majority of developments involving bedrock excavation can make a positive contribution to our understanding of local palaeontological heritage.

#### 10.1.4 Assumptions and Limitations

The accuracy and reliability of palaeontological specialist studies as components of Heritage Impact Assessments are **generally** limited by the following constraints:

1. Inadequate database for fossil heritage for much of South Africa, given the large size of the country and the small number of professional palaeontologists carrying out fieldwork here. Most development study areas - including the Scatec Solar project area - have never been surveyed by a palaeontologist.
2. Variable accuracy of geological maps which underpin these desktop studies. For large areas of terrain these maps are largely based on aerial photographs alone, without ground-truthing. The maps generally depict only significant (“mappable”) bedrock units as well as major areas of superficial “drift” deposits (alluvium, colluvium) but for most regions give little or no idea of the level of bedrock outcrop, depth of superficial cover (soil etc.), degree of bedrock weathering or levels of small-scale tectonic deformation, such as cleavage. All of these factors may have a major influence on the impact significance of a given development on fossil heritage and can only be reliably assessed in the field.
3. Inadequate sheet explanations for geological maps, with little or no attention paid to palaeontological issues in many cases, including poor locality information.
4. The extensive relevant palaeontological “grey literature” - in the form of unpublished university theses, impact studies and other reports (e.g. of commercial mining companies) - that is not readily available for desktop studies.
5. Absence of a comprehensive computerized database of fossil collections in major South African institutions which can be consulted for impact studies. A Karoo fossil vertebrate database is now accessible for impact study work.

In the case of palaeontological desktop studies without supporting Phase 1 field assessments these limitations may variously lead to either:

- (a) underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- (b) overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by tectonism or weathering, or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium *etc.*).

Since most areas of South Africa have not been studied palaeontologically, a palaeontological desktop study usually entails inferring the presence of buried fossil heritage within the study area from relevant fossil data collected from similar or the same rock units elsewhere, sometimes at localities far away. Where substantial exposures of bedrocks or potentially fossiliferous superficial

sediments are present in the study area, the reliability of a palaeontological impact assessment may be significantly enhanced through field assessment by a professional palaeontologist.

In the case of the Scatec Solar project area near Kenhardt in the Northern Cape, bedrock exposure is limited due to extensive cover by superficial deposits (e.g. alluvium, soils, surface gravels), especially in areas of low relief, as well as by pervasive *bossieveld* vegetation. For this reason, as well as the low palaeontological sensitivity of the sedimentary rocks mapped in the project area, a desktop-level rather than field-based assessment was considered appropriate for this study. Despite the lack of palaeontological field data from the project area itself, confidence levels in the conclusions reached in the desktop study are moderately high because of the author's field experience of the sedimentary rocks represented in the wider Bushmanland region (See reference list for previous palaeontological assessments in the area; e.g. Almond 2009, 2011, 2014a, 2014b, 2014c, 2014d). Recent palaeontological heritage assessments for several other alternative energy developments in the region have been taken into consideration (e.g. the Nieuwehoop Solar Park just to the east of the Scatec Solar project area).

In terms of the impact assessment, the methodology adopted is outlined in Chapter 4 of the EIA Report, which also notes the developments within a 20 km radius that have been considered in order to assess cumulative impacts.

### 10.1.5 Sources of Information

The information used in this desktop study was based on the following sources:

1. A detailed project outline supplied by the CSIR - Environmental Management Services.
2. Previous desktop palaeontological assessment reports for study areas in the Kenhardt region by the author (Almond 2009, 2011, 2014a, 2014b, 2014c, 2014d).
3. A review of the relevant scientific literature, including published geological maps (e.g. 1: 250 000 scale geological map sheet 2920 Kenhardt published by the Council for Geoscience, Pretoria) and accompanying sheet explanations (e.g. Slabbert *et al.* 1999)
4. The author's previous field experience with the formations concerned and their palaeontological heritage (cf Almond and Pether 2008; SAHRIS website).

### 10.1.6 Declaration of Independence of Specialists

Refer to Appendix A of this EIA Report for the Curriculum Vitae of Dr. John Almond, which highlights his experience and expertise. The declaration of independence by the specialist is provided in Box 10.1 below and included in Appendix B of this EIA Report.

#### BOX 10.1: DECLARATION OF INDEPENDENCE

I, John Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Kenhardt PV 1 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.



JOHN ALMOND

## 10.2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO PALAEOLOGICAL HERITAGE IMPACTS

---

As noted above, the Scatec Solar project area near Kenhardt is located in a region of Bushmanland that is underlain by potentially fossiliferous sedimentary rocks of Late Tertiary or Quaternary age as well as by unfossiliferous basement rocks (as discussed in Section 10.3 of this chapter). The construction phase of the proposed development will entail substantial excavations into the superficial sediment cover and locally into the underlying bedrock as well. These include, for example, surface clearance operations, excavations for the solar array footings, underground cables, access and internal gravel roads, 132 kV transmission line towers (which has been subjected to a separate Basic Assessment Process), on-site substation, laydown areas, stormwater channels, water pipelines (if required) and foundations for buildings (offices, operational control centre, warehouse/workshop). All these developments may adversely affect potential, legally-protected fossil heritage resources within the study area by destroying, disturbing or permanently sealing-in fossils at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

The planning, operational and decommissioning phases of the proposed solar energy facility are very unlikely to involve additional adverse impacts on local palaeontological heritage, however.

A detailed description of the proposed project is included in Chapter 2 of the EIA Report. A detailed description of the transmission line corridor is provided and assessed separately in the Basic Assessment for the Kenhardt PV 1 - Transmission Line project.

## 10.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

---

In this section of the report an outline of the geology of the proposed Kenhardt PV 1 project area is first given, based on the relevant geological maps and scientific literature. This is followed by a brief review of fossil heritage that has previously been recorded from the sedimentary rock units that are represented within the project area.

### 10.3.1 Geological Context

---

As mentioned above, the study area for the proposed Kenhardt PV 1 project, located on the Farm Onder Rugzeer 168 located some 20 km northeast of Kenhardt, Northern Cape, is situated within the semi-arid Bushmanland region between c. 950 to 900 m amsl, with a general slope towards the south. It is drained by a dendritic network of shallow, southwest-flowing tributary streams of the Hartbeesrivier, such as the Rugseersrivier in the south and the Wolfkop se Loop in the north. The geology of the study area is shown on 1: 250 000 geology sheet 2920 Kenhardt (Council for Geoscience, Pretoria) (Figure 10.1). The entire area is underlain at depth by a variety of Precambrian basement rocks that are c. 2 billion years old and are 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 NW-SE trending fault zone and lie to the north of the major Wolfkop Fault. The basement rock units represented in the PV 1 study area includes the **Jacomyns Pan Group** (gneisses of the Sandnoute Formation) and the **Keimoes Suite** (Elsie se Gorra Granite). These rock units are described in the Kenhardt 1: 250 000 sheet explanation by Slabbert *et al.* (1999) and placed in the context of the Namaqua-Natal Province by Cornell *et al.* (2006). However, they are entirely unfossiliferous and so will not be discussed further here.

A large proportion of the basement rocks in the proposed project area 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 - especially - Quaternary to Recent aeolian (wind-blown) sands

of the Gordonia Formation (Kalahari Group). The basement rocks in the PV 1 study area is largely mantled by aeolian sands of the **Gordonia Formation** (“Kalahari sands”) as well as Late Caenozoic alluvial deposits.

The geology of the Late Cretaceous to Recent Kalahari Group is reviewed by Thomas (1981), Dingle *et al.* (1983), Thomas & Shaw (1991), Haddon (2000) and Partridge *et al.* (2006). The thickness of the unconsolidated Kalahari sands in the Bushmanland area is variable and often uncertain. The Gordonia Formation dune sands are considered to range in age from the Late Pliocene/Early Pleistocene to Recent, dated in part from enclosed Middle to Late Stone Age stone tools (Dingle *et al.*, 1983, p. 291). Note that the recent extension of the Pliocene - Pleistocene boundary from 1.8 Ma back to 2.588 Ma would place the older Gordonia Formation sands entirely within the Pleistocene Epoch. A number of older Kalahari formations underlie the young wind-blown surface sands in the main Kalahari depository to the north of the study area. However, at the latitude of the study area near Kenhardt (c. 29° S) Gordonia Formation sands less than 30 m thick are likely to be the main or perhaps only Kalahari sediments present (*cf* isopach map of the Kalahari Group, Figure 6 in Partridge *et al.*, 2006). These unconsolidated sands will be locally underlain by thin subsurface gravels along the buried palaeosurface and perhaps by calcretes of Pleistocene or younger age (*cf* Mokalanen Formation).

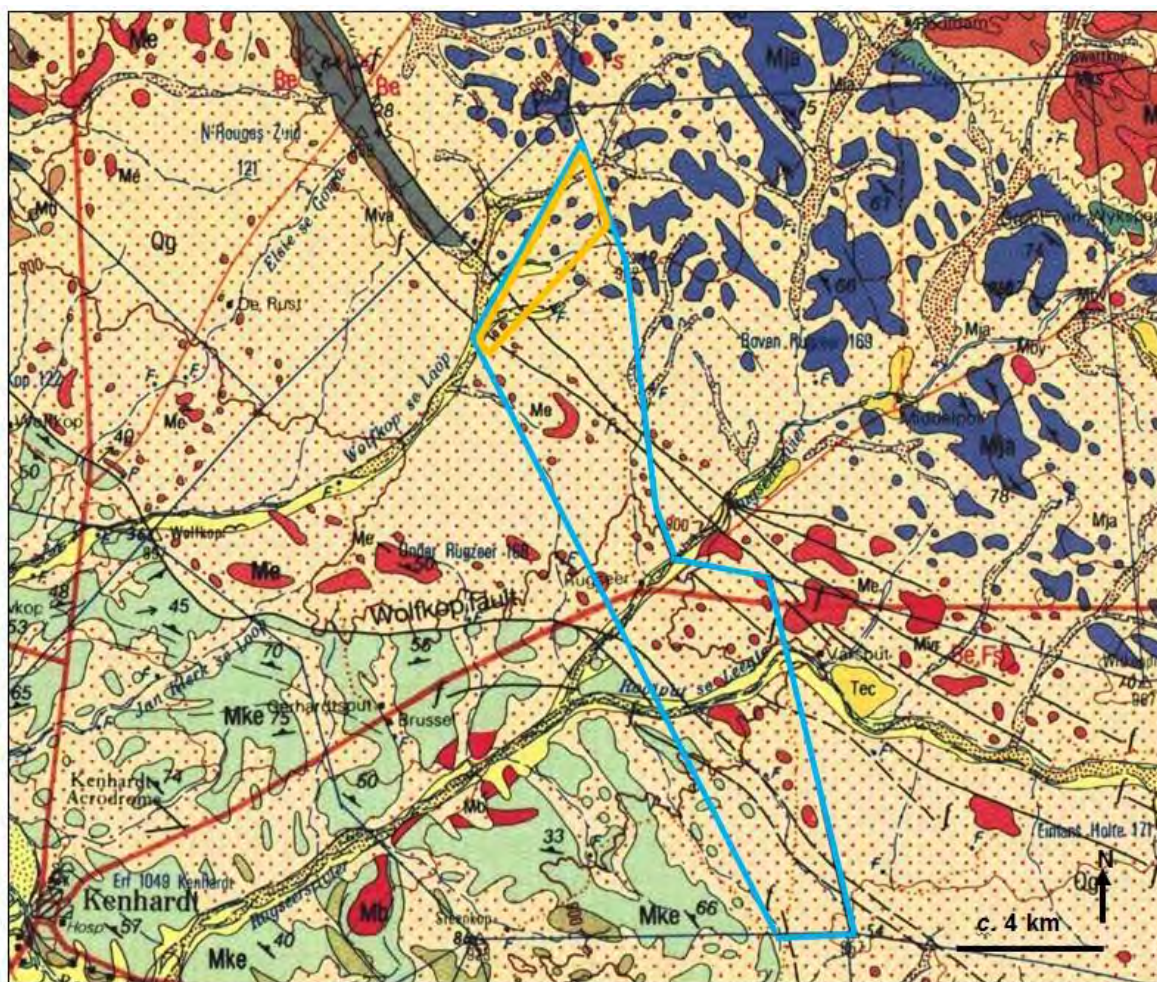


Figure 10.1: Extract from 1: 250 000 scale geological map sheet 2920 Kenhardt (Council for Geoscience, Pretoria) showing the geology of the Scatec Solar PV Facility study area on Farm Onder Rugzeer 168 (blue polygon) situated c. 20 km to the NE of Kenhardt, Northern Cape. The PV 1 study site is approximately indicated by the orange polygon in the north.

Linked to Figure 10.1 above, the main geological units represented within the broader Scatec Solar project area include:

#### **PRECAMBRIAN BASEMENT ROCKS:**

##### **KEIMOES SUITE:**

- Red (Me) = Elsie se Gorra Granite

##### **KORANNALAND SUPERGROUP:**

- Brown (Mva) = Valsvlei Formation, Biesje Poort Group
- Grey (Msa) = Sandputs Formation, Biesje Poort Group
- Blue (Mja) = Sandnoute Formation, Jacomyns Pan Group

##### **VYFBEKER METAMORPHIC SUITE:**

- Pale blue-green (Mke) = Kenhardt Migmatite

#### **LATE CAENOZOIC SUPERFICIAL SEDIMENTS:**

- Pale yellow with sparse red stipple (Qg) = aeolian sands of the Gordonia Formation (Kalahari Group)
- Pale yellow with dense red stipple = alluvial and pan sediments
- Dark yellow (Tec) = calcrete

### **10.3.2 Palaeontological Heritage**

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The Precambrian basement rocks represented within the study area are igneous granitoids or high grade metamorphic rocks that were last metamorphosed some 1 billion years ago and are entirely unfossiliferous. The sparse fossil record of Late Caenozoic superficial sediments in the Bushmanland region are briefly reviewed here (Refer also to Table 10.1). Note that, to the author's knowledge, there are no fossil records from the broader Scatec Solar project area itself and no palaeontological fieldwork has been undertaken here.

The diverse superficial deposits within the South African interior, including Bushmanland, have been comparatively neglected in palaeontological terms. However, sediments associated with ancient drainage systems, springs and pans may occasionally contain important fossil biotas, notably the bones, teeth and horn cores of mammals as well as remains of reptiles like tortoises (e.g. Skead 1980, Klein 1984, Brink 1987, Bousman *et al.* 1988, Bender & Brink 1992, Brink *et al.* 1995, MacRae 1999, Meadows & Watkeys 1999, Churchill *et al.* 2000, Partridge & Scott 2000, Brink & Rossouw 2000, Rossouw 2006, Almond *in* Macey *et al.* 2011). Other late Caenozoic fossil biotas that may occur within these superficial deposits include non-marine molluscs (bivalves, gastropods), ostrich egg shells, trace fossils (e.g. calcretised termitaria, coprolites, invertebrate burrows, rhizocretions), and plant material such as peats or palynomorphs (pollens) in organic-rich alluvial horizons (Scott 2000) and diatoms in pan sediments. In Quaternary deposits, fossil remains may be associated with human artefacts such as stone tools and are also of archaeological interest (e.g. Smith 1999 and references therein). Ancient solution hollows within extensive calcrete hardpans may have acted as animal traps in the past. As with coastal and interior limestones, they might occasionally contain mammalian bones and teeth (perhaps associated with *hyaena dens*) or invertebrate remains such as snail shells.

Diverse fossils associated with the ancient Tertiary drainage systems of the Karoo and Bushmanland region have been summarized by Almond *in* Macey *et al.* (2011). See also articles by Cooke 1949, Wells 1964, Butzer *et al.* 1973, Helgren 1977, Klein 1984, Macrae 1999). They include remains of fish, reptiles, mammals, freshwater molluscs, petrified wood and trace fossils (e.g. De Wit 1990, 1993, De Wit & Bamford 1993, Bamford 2000, Bamford & De Wit 1993, Senut *et al.* 1996).

In the Brandvlei area to the southwest of Kenhardt lies the north-south trending Geelvloer Palaeo-valley, a Mid Tertiary palaeodrainage system that links up with the Commissioners Pan - Koa Valley

system to the northwest. Here calcretised basal alluvial facies contain bones of hippopotamus-like artiodactyls called anthracotherids indicating a Miocene age (De Wit 1993, 1999, De Wit *et al.* 2000). Anthracotherids are an extinct group of amphibious mammalian herbivores only distantly related to true hippos that were widespread in the Miocene of Africa (Schneider & Marais 2004). Early to Mid-Miocene silicified woods from Brandvlei are referable to a number of extant tree families, including the Dipterocarpaceae that mainly inhabit tropical forests in Africa and Asia today. The fossil woods and associated sediments indicate that warm, tropical to subtropical climates prevailed in the Mid-Miocene and that perennial, low-sinuosity braided river systems supported lush riparian forests (De Wit & Bamford 1993, Bamford & De Wit 1993, Bamford 2000). Wet, weakly seasonal climates are suggested by the structure (indistinct growth rings) and dimensions (trunk diameters of over 50 cm) of the fossil woods (Bamford 2000).

Abraded Plio-Pleistocene fossil woods from relict alluvial terraces of the Sak River just north of Brandvlei include members of the Family Polygalaceae and also indicate humid growth conditions (Bamford & De Wit 1993). These terraces were formed by meandering rivers during intermittent pluvial (i.e. wetter), but still semi-arid, episodes following the onset of generally arid conditions in the western portion of southern Africa towards the end of the Miocene. So far fossils have not been recorded from the Sakrivier system closer to Kenhardt.

Pan sediments in Bushmanland have also recently yielded interesting Pleistocene mammalian faunas in association with age-diagnostic archaeological material. Important fossil mammalian remains assigned to the Florisian Mammal Age (c. 300 000 - 12 000 BP; MacRae 1999) have recently been documented from stratigraphic units designated Group 4 to Group 6 (i.e. calcrete hardpan and below) at Bundu Pan, some 22 km northwest of Copperton (Kiberd 2006 and references therein). These are among very few Middle Pleistocene faunal records from stratified deposits in the southern Africa region (Klein 1980, 1984a, 1984b, 2000) and are therefore of high palaeontological significance. Characteristic extinct Pleistocene species recorded at Bundu Pan are the giant Cape Horse or Zebra (*Equus capensis*) and the Giant Hartebeest (*Megalotragus priscus*). Other extant to extinct taxa include species of warthog, blesbok, black wildebeest, springbok and baboon. There is additionally trace fossil evidence for hyaenids (tooth marks) as well as ostrich egg shell. Preliminary dating and the inferred ecology of the fossil taxa present suggests the presence of standing water within a grassy savanna setting during the 200 - 300 000 BP interval when the Bundu Pan faunal assemblage accumulated. A sequence of Earlier, Middle and Later Stone Age (ESA, MSA and LSA, respectively) artefact assemblages is also recorded from this site. Stratigraphic Groups 4 to 6 (i.e. calcrete hardpan and below) contain a Final Acheulian or transitional ESA/MSA artefact assemblage, while Groups 2 - 3 above the calcrete horizon contain a MSA artefact assemblage. Orton (2012) recorded a single fossil equid tooth associated with a rich MSA artefact assemblage from gravels overlying a calcrete hardpan on the farm Hoekplaas near Copperton. This horizon is probably equivalent to Group 3 of Kiberd's stratigraphy at Bundu Pan, and therefore somewhat younger than the Florisian mammal fauna reported there.

The fossil record of the Kalahari Group as a whole is generally sparse and low in diversity; no fossils are recorded here in the Kenhardt geology sheet explanation by Slabbert *et al.* (1999). The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. Porous dune sands are not generally conducive to fossil preservation. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from underlying lime-rich bedrocks may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (e.g. *Hodotermes*, the harvester termite), ostrich egg shells (*Struthio*), tortoise remains and shells of land snails (e.g. *Trigonephrus*) (Almond in Macey *et al.* 2011, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (e.g. *Corbula*, *Unio*), ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands (Du Toit 1954, Dingle *et al.*, 1983). These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and the overall palaeontological sensitivity of the

Gordonia Formation is therefore considered to be low. Underlying calcretes might also contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways. Mammalian bones, teeth and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings) may be expected occasionally expected within Kalahari Group sediments and calcretes, notably those associated with ancient alluvial gravels (See Koa River Valley above). The younger (Pleistocene to Recent) fluvial and alluvial sands and gravels within the proposed development area are unlikely to contain many, if any, substantial fossil or subfossil remains.

**Table 10.1: Fossil heritage recorded from the major rock units that are represented within the broader Scatec Solar study area near Kenhardt**

GEOLOGICAL UNIT	ROCK TYPES AND AGE	FOSSIL HERITAGE	PALAEONTOLOGICAL SENSITIVITY
LATE CAENOZOIC SUPERFICIAL SEDIMENTS, especially	fluvial, pan, lake and terrestrial sediments, including diatomite (diatom deposits), pedocretes (e.g. calcrete), colluvium (slope deposits such as scree), aeolian sands (Gordonia Formation, Kalahari Group)	bones and teeth of wide range of mammals (e.g. mastodont proboscideans, rhinos, bovids, horses, micromammals), fish, reptiles (crocodiles, tortoises), ostrich egg shells, fish, freshwater and terrestrial molluscs (unionid bivalves, gastropods), crabs, trace fossils (e.g. calcretised termitaria, horizontal invertebrate burrows, stone artefacts), petrified wood, leaves, rhizoliths, stromatolites, diatom floras, peats and palynomorphs.	GENERALLY LOW BUT LOCALLY HIGH  (e.g. Tertiary alluvium associated with old river courses)
ALLUVIAL AND PAN SEDIMENTS	LATE TERTIARY, PLEISTOCENE TO RECENT		
Basement granites and gneisses	Highly-metamorphosed sediments, intrusive granites	None	ZERO
NAMAQUA-NATAL PROVINCE	MID-PROTEROZOIC (c.1- 2 billion years old)		

## 10.4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

All South African fossil heritage, including palaeontological sites and specimens, is protected by law (National Heritage Resources Act (Act 25 of 1999) and fossils cannot be collected, damaged, destroyed or disturbed without a permit from SAHRA or the relevant Provincial Heritage Resources Agency.

As mentioned previously, where palaeontological mitigation of a development project is required, the palaeontologist concerned with mitigation work would need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies recently developed by SAHRA (2013).

The present palaeontological heritage assessment falls under Sections 35 and 38 (Heritage Resources Management) of the National Heritage Resources Act (Act 25 of 1999), and it will also inform the Environmental Management Programme for this project.



The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites; and
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act (Act 25 of 1999), dealing with archaeology, palaeontology and meteorites:

- 1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.
- 2) All archaeological objects, palaeontological material and meteorites are the property of the State.
- 3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- 4) No person may, without a permit issued by the responsible heritage resources authority—
  - i. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
  - ii. destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
  - iii. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
  - iv. 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.
- 5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—
  - a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
  - b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
  - c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
  - d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

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## 10.5 IDENTIFICATION OF KEY ISSUES

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### *10.5.1 Key Issues Identified During the Scoping Phase*

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The only key issue identified by the specialist during the Scoping Phase is the potential loss of palaeontological heritage resources (fossils, fossil sites including their geological context) through surface clearance and excavations into sedimentary rocks during the construction phase of the project.

The Scoping Report was released for a 30-day comment period which extended from 25 September 2015 to 27 October 2015. The Addendum to the Scoping Report was also released for a 30-day comment period, extending from 6 October 2015 to 5 November 2015. To date, only two comments were raised by the SAHRA regarding impacts on palaeontological heritage posed by the proposed Scatec Solar development. No further comments have been received in relation to palaeontological impacts.

The following comment was received from the SAHRA on 22 September 2015 (via SAHRIS) based on the review of the Background Information Document. It is important to note that only the points relating to palaeontological aspects have been extracted from the SAHRA comments and noted below:

- *The PalaeoSensitivity Map on SAHRIS (<http://www.sahra.org.za/sahris/map/palaeo>) indicates moderate palaeontological sensitivity for the proposed area. Therefore, the SAHRA Archaeology, Palaeontology and Meteorites Unit requires a desktop Palaeontological Impact Assessment to be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.*

As noted above, based on the low palaeontological sensitivity of the area, this desktop Palaeontological Impact Assessment is being undertaken during the EIA Phase (i.e. prior to the commencement of construction of the Kenhardt PV 1 project (subject to the issuing of an Environmental Authorisation)). As mentioned above, this specialist assessment is conducted by Dr. John Almond in order to assess the significance of potential impacts of the proposed project on palaeontological resources (which is discussed in Section 10.6 of this chapter).

Comments received from the SAHRA on 5 April 2016 (via SAHRIS) based on the 30-day review of the EIA Report are included in Chapter 6 of the EIA Report, together with corresponding responses.

### **10.5.2 Identification of Potential Impacts**

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The potential impacts identified during the EIA Phase are:

### **10.5.3 Construction Phase**

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- 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.

### **10.5.4 Operational Phase**

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No significant impacts on palaeontological heritage are anticipated during the operational phase of the development.

### **10.5.5 Decommissioning Phase**

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No significant impacts on palaeontological heritage are anticipated during the decommissioning phase of the development.

### 10.5.6 Cumulative Impacts

- Potential cumulative 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 of several alternative energy facilities within the broader Kenhardt region and other key electrical infrastructure developments within a 20 km radius of the proposed project site.

## 10.6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

In this section of the report potential impacts of the construction, operational and decommissioning phases of the proposed PV solar facility development on palaeontological heritage are outlined and recommendations for any necessary monitoring or mitigation are provided. Possible cumulative impacts in the light of other alternative energy development proposals in the Kenhardt region are also evaluated.

### 10.6.1 Potential Impact 1: Construction Phase

The construction phase of the proposed solar energy facility will entail substantial surface clearance and shallow excavations into the superficial sediment cover (aeolian sands, surface gravels, stream alluvium etc.), which may contain fossil remains, and in some cases also into the underlying unfossiliferous bedrock. These include, for example, surface clearance operations, excavations and foundations (which will likely be drilled and concreted into the ground) for the solar array footings, underground cables, access and internal gravel roads, 132 kV transmission line towers (which has been subjected to a separate Basic Assessment Process), on-site substation, laydown areas, stormwater channels, water pipelines and foundations for buildings (offices, operational control centre, warehouse/workshop). As a result, fossils at the ground surface or buried beneath it may be disturbed, damaged, destroyed or sealed-in while their scientifically informative sedimentary context will also be disturbed or destroyed.

Desktop analysis of the fossil records of the various rock units underlying the proposed project area indicates that the majority of these units are of zero to low palaeontological sensitivity (as discussed in Section 10.3.2 and Table 10.1 of this chapter). The basement rocks are entirely unfossiliferous while the overlying Late Cenozoic superficial sediments (wind-blown sands, alluvium, gravels etc.) are of low to very low palaeontological sensitivity. Construction of the solar panel arrays, overhead power lines, buildings and associated infrastructure is therefore unlikely to entail significant impacts on local fossil heritage resources.

The inferred impact of the proposed solar facility development on local fossil heritage is assessed in Table 10.2 below. This assessment applies only to the construction phase of the development since further impacts on fossil heritage during the operational and decommissioning phases of the solar energy facility are not anticipated.

The destruction, damage or disturbance out of context of fossils and fossil sites preserved at the ground surface or below ground represents a *direct negative* impact that is confined to the development footprint (*site specific*). Such impacts are made only during the construction period, and can usually be partially mitigated but cannot be fully rectified; *i.e.* they are *non-reversible* and of *permanent* duration. Since several of the sedimentary units represented within the study area do contain fossils of some sort, some level impact on fossil heritage is probable (*likely*). However, because of the generally very sparse occurrence of well-preserved, scientifically-valuable fossils within the superficial sediments, and because most of the fossils encountered are likely to be of widespread occurrence (low irreplaceability) the consequence of these impacts is rated as *slight*.

No previously recorded areas or sites of exceptional fossil heritage sensitivity or significance have been identified within the proposed project area as a whole. Due to the inferred scarcity of exceptional fossil remains within the study area, the overall impact significance of the construction phase of the proposed solar energy project is assessed as *VERY LOW* (without mitigation). Due to the paucity of palaeontological field studies within this part of Bushmanland, confidence levels for this desktop palaeontological heritage assessment are only moderate (medium).

Specialist palaeontological monitoring and mitigation for this project are not recommended, pending the discovery of new fossil sites during development, given its low impact significance. The Environmental Control Officer responsible for the construction phase of the project should be aware of the necessity of conserving fossils and should monitor all substantial excavations into sedimentary rocks for fossil remains. Proposed mitigation of chance fossil finds during the construction phase involves safeguarding of the fossils (preferably *in situ*) by the responsible Environmental Control Officer, reporting of finds to the SAHRA and, where appropriate, judicious sampling and recording of fossil material and associated geological data by a qualified palaeontologist (as discussed in Section 10.8 of this chapter). Should these recommended mitigation measures be fully implemented, the impact significance of the development would remain *VERY LOW* but small residual negative impacts (e.g. loss of undetected fossils) would remain. However, these negative impacts would be partially offset through the improved scientific understanding of local palaeontological heritage in a hitherto poorly-studied region of South Africa which would be considered as a significant *positive* outcome.

There are no fatal flaws in the proposed development proposal as far as fossil heritage is concerned.

### **10.6.2 Potential Impacts (Operational and Decommissioning Phases)**

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No significant impacts on fossil heritage resources are anticipated during the operational and decommissioning phases of the proposed solar energy facility.

### **10.6.3 Cumulative Impacts**

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The palaeontological heritage impact significance of all three solar energy developments and associated electrical infrastructure proposed by Scatec Solar, as well as other proposed solar facilities and electrical infrastructure (discussed in Chapter 4 of the EIA Report) near Kenhardt (within a 20 km radius of the proposed project) are rated equally as very low. The potentially fossiliferous sedimentary rock units represented within the broader project area are of widespread occurrence and this is also likely to apply to most of the fossils they contain. It is concluded that the cumulative impact on fossil heritage resources posed by the proposed solar facilities and associated electrical infrastructure to the northeast of Kenhardt is of a low significance.

Given the generally low palaeontological sensitivity of the basement and overlying sedimentary rocks in the broader eastern Bushmanland region, significant cumulative impacts on fossil heritage are not anticipated here as a result of the various alternative energy and other infrastructure developments that have been proposed here (refer to the several recent palaeontological impact assessments undertaken by the author for projects near Kenhardt that are listed in the references).

## **10.7 IMPACT ASSESSMENT SUMMARY**

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The assessment of impacts on palaeontological heritage resources as well as recommended mitigation and monitoring measures, as discussed above, are collated in Tables 10.2 and 10.3 below.

The no-go option (no solar developments) will have a neutral impact on local palaeontological heritage resources.

**Table 10.2: Impact assessment summary table for the Construction Phase**

Construction Phase													
Direct Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Probabi- lity	Reversibi- lity of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Management	With Mitigation/ Management (Residual Impact/ Risk)		
Surface clearance and excavations into superficial sediments	Loss of fossil heritage at or beneath ground surface	Negative	Site	Permanent	Slight	Likely	Non- reversible	Low	<ul style="list-style-type: none"> <li>Undertake monitoring of all substantial excavations into sedimentary rocks for fossil remains and safeguard any finds in situ.</li> <li>Appoint a professional palaeontologist to record and sample any chance fossil finds</li> </ul>	Very low	Very low	5	Medium

**Table 10.3: Cumulative impact assessment summary table**

Cumulative Impacts													
Aspect/ Impact Pathway	Nature of Potential Impact/ Risk	Status	Spatial Extent	Duration	Conse- quence	Probab- ility	Reversibi- lity of Impact	Irreplace- ability	Potential Mitigation Measures	Significance of Impact and Risk		Ranking of Residual Impact/ Risk	Confidence Level
										Without Mitigation/ Managemen t	With Mitigation/ Management (Residual Impact/ Risk)		
Surface clearance and excavations into superficial sediments	Loss of fossil heritage at or beneath ground surface	Negative	Site	Permanent	Slight	Likely	Non- reversible	Low	<ul style="list-style-type: none"> <li>Undertake monitoring of all substantial excavations into sedimentary rocks for fossil remains and safeguard any finds in situ.</li> <li>Appoint a professional palaeontologist to record and sample any chance fossil finds</li> </ul>	Very low	Very low	5	Medium

## 10.8 INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

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Given the low palaeontological sensitivity of the proposed project area, as determined from desktop analysis, as well as the inferred very low impact significance of the alternative energy projects for fossil heritage conservation, no specialist palaeontological monitoring or mitigation is recommended here, pending the discovery of substantial new fossil remains during construction.

During the construction phase all substantial bedrock excavations should be monitored for fossil material by the responsible Environmental Control Officer. Should significant fossil remains - such as vertebrate bones and teeth, plant-rich fossil lenses, petrified wood or dense fossil burrow assemblages - be exposed during construction, the responsible Environmental Control Officer should safeguard these, preferably *in situ*. The SAHRA should be alerted as soon as possible (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000, Tel: 021 462 4502, Email: cscheermeyer@sahra.org.za), so that appropriate action can be taken by a professional palaeontologist, at the developer's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a professional palaeontologist.

The palaeontologist concerned with mitigation work will need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection). All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies recently developed by SAHRA (2013).

No monitoring or mitigation is required during the operational and decommissioning phases of the development.

These mitigation recommendations (as summarised in Part B of the EIA Report) should be incorporated into the Environmental Management Programme for each Solar PV energy facility proposed by Scatec Solar.

## 10.9 CONCLUSION AND RECOMMENDATIONS

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The preferred area for the PV facility is underlain at depth by Precambrian basement rocks (c. 1-2 billion years old) assigned to the Namaqua-Natal Province. These ancient igneous and high-grade metamorphic rocks - mainly granites and gneisses of the Keimoes Suite and Jacomynspan Group - crop out at surface in small areas and are entirely unfossiliferous. A large proportion of the basement rocks are mantled by a range of superficial sediments of Late Caenozoic age that may contain sparse fossil remains. These predominantly thin, unconsolidated deposits include small patches of calcretes, gravelly to sandy river alluvium, pan sediments, surface gravels, colluvium (scree) as well as Pleistocene to Recent wind-blown sands of the Gordonia Formation (Kalahari Group). 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 elsewhere 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.

No previously recorded areas or sites of exceptional fossil heritage sensitivity or significance have been identified within the Scatec Solar project area as a whole. Due to the inferred scarcity of scientifically important fossil remains within the PV 1 study area, the overall impact significance of the construction phase of the proposed solar energy project is assessed as VERY LOW (before and after mitigation). No significant impacts on fossil heritage are anticipated during the operational and decommissioning phases of the proposed solar energy facility. The potentially fossiliferous



sedimentary rock units represented within the study area (e.g. Gordonia sands, calcrete) are of widespread occurrence and this is also likely to apply to most of the fossils they contain. It is concluded that the cumulative impacts on fossil heritage resources posed by the known alternative energy and other infrastructural developments in the region (as explained in Chapter 4 of the EIA Report) is of very low significance. There are no fatal flaws in the proposed solar facility development, nor are there objections to its authorisation as far as fossil heritage conservation is concerned, since significant impacts on scientifically valuable fossils or fossil sites are not anticipated here. The only proposed condition to accompany environmental authorisation is that the recommendations for monitoring and mitigation included in the EMPr are fully complied with. The no-go option (no solar developments) will have a neutral impact on local palaeontological heritage resources.

Given the low palaeontological sensitivity of the eastern Bushmanland region, as determined from desktop and field-based studies, as well as the inferred very low impact significance of the Kenhardt PV 1 75 MW Solar PV Facility for fossil heritage conservation, no specialist palaeontological monitoring or mitigation is recommended here, pending the discovery of substantial new fossil remains during construction. Mitigation measures and monitoring recommendations for inclusion in the EMPr are discussed in Sections 10.6 and 10.8 of this report.

In this report the entire site (preferred) for Kenhardt PV 1 75 MW Solar PV Facility on the remaining extent of Onder Rugzeer Farm 168 has been assessed based on the worst case scenario. From a palaeontological heritage impact point of view, the applicant can select any 250 ha area within the surveyed area to build the PV plant, provided that the recommended mitigation measures are implemented as applicable.

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