

Environmental Impact Assessment for the  
proposed Leliehoek PV solar energy project and  
supporting electrical infrastructure near  
Dealesville in the Free State.

CSIR Report No.:  
CSIR/CAS/EMS/ER/2014/0011/B

July 2015





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# CONTENTS

<b>Section A</b>	
<b>Executive Summary</b>	
<i>Chapter 1</i>	<b>Introduction</b>
<i>Chapter 2</i>	<b>Project Description</b>
<i>Chapter 3</i>	<b>Assessment of Alternatives</b>
<i>Chapter 4</i>	<b>EIA approach</b>
<i>Chapter 5</i>	<b>Description of Receiving Environment</b>
<i>Chapter 6</i>	<b>Environmental Impact Assessment</b>
<i>Chapter 7</i>	<b>Electrical Infrastructure</b>
<i>Chapter 8</i>	<b>Conclusions and Recommendations</b>
<i>Appendix A</i>	<p><b><u>Appendix A: DEA correspondence, EAPs and Specialist Declaration of Independence and CVs</u></b></p> <p>App A.1 Amended Environmental Authorisation application form and DEA acknowledgement of receipt for original EA application            App A.2 Acknowledgement of receipt of the Draft Scoping Report            App A.3 Acknowledgement of receipt of the Final Scoping Report            App A.4 Acceptance of Scoping Report and Plan of Study Approval            App A.5 Declaration of Independence of EAP and specialists            App A.6 CVs of EAPs (specialist CVs attached in Specialist Volume)</p>
<i>Appendix B</i>	<p><b><u>Appendix B: Maps and title deeds</u></b></p> <p>App B.1 Environmental sensitivity map            App B.2 Layout plan            App B.3 Title Deeds                B.3.1 Project site                B.3.2 Supporting electrical infrastructure</p>
<i>Appendix C</i>	<p><b><u>Appendix C: Public Participation</u></b></p> <p>Appendix C.1. Site photos and notices            Appendix C.2. Advert            Appendix C.3. I&amp;AP database            Appendix C.4. Correspondence sent Draft and Final Scoping Reports and Draft EIAR            Appendix C.5. Correspondence Received Draft and Final Scoping Reports and Draft EIAR            Appendix C.6. Comments and Response Report</p>
<b>Section B</b>	
<b>Draft Environmental Management Programme</b>	

# REPORT DETAILS

<b>Title:</b>	Environmental Impact Assessment Report for the proposed Leliehoek PV solar energy project and supporting electrical infrastructure near Dealesville in the Free State
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<b>CSIR Report Number:</b>	CSIR/CAS/EMS/ER/2014/0011/B
<b>CSIR Project Number:</b>	EMS0088
<b>DEA Ref Number:</b>	14/12/16/3/3/2/728
<b>Date:</b>	July 2015
<b>To be cited as:</b>	CSIR, 2015. Environmental Impact Assessment Report for the proposed Leliehoek PV solar energy project and supporting electrical infrastructure near Dealesville in the Free State CSIR Report number: CSIR/CAS/EMS/ER/2014/0011/B

# SUMMARY

## DEA information requirements

General Site Information	Reference in the report
Description of all affected farm portions	Chapter 6
21 digit Surveyor General codes of all affected farm portions	F0040000000095300000 F0040000000030500000 F00400000000103000000 F00400000000103100001 F00400000000103100000 F0040000000095300000 F0040000000030500000 F0040000000014800000 F0040000000054600000 F0040000000074800000 F0040000000074900000 F0040000000014900000
Copies of title deeds of all affected land portions	Appendix B.3
Photos of areas that give a visual perspective of all parts of the site	Chapter 6, Section 6.2.1 and Visual Impact Assessment Study, attached in Volume 2
Photos from sensitive visual receptors (tourism routes, tourism facilities, etc.)	Visual Impact Assessment Study, attached in Volume 2
Solar plan design specifications including: <ol style="list-style-type: none"> <li>1. Type of technology</li> <li>2. Structure height</li> <li>3. Surface area to be covered (including associated infrastructure such as roads)</li> <li>4. Structure orientation</li> <li>5. Laydown area dimensions (construction period and thereafter)</li> <li>6. Generation capacity</li> </ol>	The details of the project are summarised in Section 8.4 in Chapter 8 and outlined in Table 8.4.
Generation capacity of the facility as a whole at delivery points	100 MW
Site maps and GIS information	Reference in the report
All maps/information layers must also be provided in ESRI Shapefile format	Included on Compact Disk (CD) submitted with this report
All affected farm portions must be indicated	Included on CD submitted with this report
The exact site of the application must be indicated (the areas that will be occupied by the application)	Appendix B.2 contains 2 maps, one map shows the coordinates of the Development Envelope and the other shows the coordinates of the associated electrical infrastructure
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</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</li> </ul>	Included on CD and discussed in Chapter 5 and 6 of this report

<ul style="list-style-type: none"> <li>off-stream) and reservoirs</li> <li>High potential agricultural areas as defined by DAFF</li> <li>Buffer zones</li> <li>Indicated isolated residential, tourism facilities on or within 1 km of the site</li> </ul>	
A slope analysis map/layer	Included on CD submitted with this report
A map/layer that includes the locations of birds and bats including roosting and foraging areas	N/A
<p>A site development proposal map(s) that indicates:</p> <ul style="list-style-type: none"> <li>Positions of the solar facilities</li> <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> <li>Substations and/or transformers sites including their entire footprint</li> <li>Cable routes and trench dimensions</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</li> <li>Building including accommodation</li> </ul>	Figure 6.24 and Figure 8.3 and A3 map included in Appendix B.2
<b>Regional map and GIS information</b>	<b>Reference in the 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 and category	It is proposed that existing roads will be used.
Railway lines and stations	N/A
Industrial areas	N/A
Harbours and airports	N/A
Electricity transmission and distribution lines and substations	Included on CD submitted with this report
Pipelines	N/A
Water sources to be utilised during the construction and operational phases	Discussed in Section 2.3 in Chapter 2 of this report
A visibility assessment of the areas from where the facility will be visible	Chapter 6, Section 6.2.1 and Visual Impact Assessment Study, attached in Volume 2
CBAs and ESAs	N/A
Critically Endangered and Endangered Vegetation areas	Included on CD submitted with this report.
Agricultural fields	Included on CD submitted with this report
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	N/A

## Project Introduction

South Africa Mainstream Renewable Power Developments (Pty) Ltd. (Reg. No. 2009/007850/07) (“Mainstream”) intends to develop 11 solar PV or CPV projects and associated electrical infrastructure near Dealesville in the Free State province, South Africa. The projects are collectively referred to as the Kentani Solar Developments and are located within 12 km from Dealesville in the Tokologo Local Municipality which is located in the Lejweleputswa District Municipality, 50 km south-east of Boshof and 70 km north-east of Bloemfontein.

Twelve separate Environmental Authorisation (EA) application forms were submitted on 17 June 2014 to the Competent Authority (CA), the National Department of Environmental Affairs (DEA), for the twelve proposed projects. Following the submission of the twelve EA applications forms and Scoping Process, one of the projects, Klipfontein PV 1 was withdrawn. Therefore, only eleven projects form part of the suite of Kentani Solar Developments. The eleven projects, associated DEA reference numbers and generation capacities are shown in Table 1 below. Mainstream proposes to develop the facilities with a possible maximum installed capacity of 75 MW or 100 MW of electricity per project. Once a Power Purchase Agreement (PPA) is awarded, this facility will generate electricity for a minimum period of 20 years.

**Table 1: Proposed projects, generation capacity and land required.**

Project Name	DEA Reference Number	Generation Capacity (MW)	Maximum Land required (ha) for optimal efficiency
Kentani PV	14/12/16/3/3/2/724	100	~400
Klipfontein PV	14/12/16/3/3/2/722	100	~400
Braklaagte PV	14/12/16/3/3/2/727	100	~400
Meeding PV	14/12/16/3/3/2/719	100	~400
Irene PV	14/12/16/3/3/2/718	100	~400
Leliehoek PV ( <i>this project</i> )	14/12/16/3/3/2/728	100	~400
Sonoblomo PV	14/12/16/3/3/2/723	75	~300
Klipfontein PV 2	14/12/16/3/3/2/726	75	~300
Braambosch PV	14/12/16/3/3/2/725	75	~300
Boschrand PV 2	14/12/16/3/3/2/720	75	~300
Eksteen PV	14/12/16/3/3/2/717	75	~300

## Project Description

This Draft Environmental Impact Assessment Report (EIAR) has been produced for the proposed Leliehoek PV project. It is proposed that the Leliehoek PV project will have a generation capacity of 100 MW and would require ~400 ha of land to operate at optimal efficiency. The property on which the facility is to be constructed will be leased by Mainstream from the property owner(s) for the lifespan of the project. The proposed facility is located 6 km south west of Dealesville and is accessed by an untarred road. The center point coordinates for this project site is 28° 40'56.25"S; 25° 42'19.55"E.

The projects will utilise PV or CPV technology to generate electricity. The PV technology can either be fixed or track with the sun, while CPV always uses tracking. The two main components of the solar facility will consist of the solar field and the associated infrastructure. The components of the solar field and associated infrastructure are detailed below:

### Solar field

- Solar Arrays
  - Solar technology: PV or CPV; and
  - Mounting system technology: Single Axis Tracking PV, Dual Axis Tracking PV or Fixed Axis Tracking PV.
  
- Building infrastructure
  - Offices;
  - Operational control centre;
  - Warehouse/workshop;
  - Ablution facilities;
  - Converter station;
  - Battery Facility; and
  - On-site substation and substation building.
  
- Electrical infrastructure
  - 33 kV distribution lines.

### Associated infrastructure

- Transmission lines;
- Collector substations;
- Underground cabling;
- Access roads;
- Internal gravel roads;
- Fencing;
- Operation and Maintenance Area;
- Laydown Area;
- Stormwater channels; and
- Water pipelines.

## The Proponent

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Mainstream Renewable Power South Africa is a leading developer of wind and solar projects employing more than 30 people in their Cape Town and Johannesburg offices. Mainstream presently has renewable energy projects in the pipeline in excess of 5 GW in the Eastern, Northern and Western Capes as well as the Free State. Mainstream has successfully bid, won and constructed two 50 MW solar PV plants, Droogfontein PV (north of Kimberly) and De Aar PV (north of De Aar), in the Department of Energy's (DoE) Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Both PV farms are operating on time and on budget and supplying power to the national grid.



## Project Team

The CSIR has been appointed by Mainstream to undertake the EIA process for the suite of Kentani Solar Developments. The project team is presented in Table 2 below.

**Table 2: The EIA project team.**

Name	Organisation	Role
<b>Environmental Assessment Practitioners</b>		
Paul Lochner	CSIR	Project leader (EAPSA)
Surina Laurie	CSIR	Project manager
<b>Specialists</b>		
Dr. Brian Colloty	Scherman Colloty & Associates cc	Aquatic ecology specialist
Andrew Skowno and Simon Todd	Ecosol GIS Simon Todd Consulting	Terrestrial ecology specialists
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage specialist
Dr. Lloyd Rossouw	Subcontracted by ASHA Consulting (Pty) Ltd	Palaeontologist
Henry Holland	MapThis Trust	Visual impact specialist
Dr. Hugo van Zyl	Independent Economic Researchers	Socio-economic specialist
Johann Lanz	Private consultant	Agriculture and soil specialist
Luke Strugnell	Wildskies	Avifaunal specialist

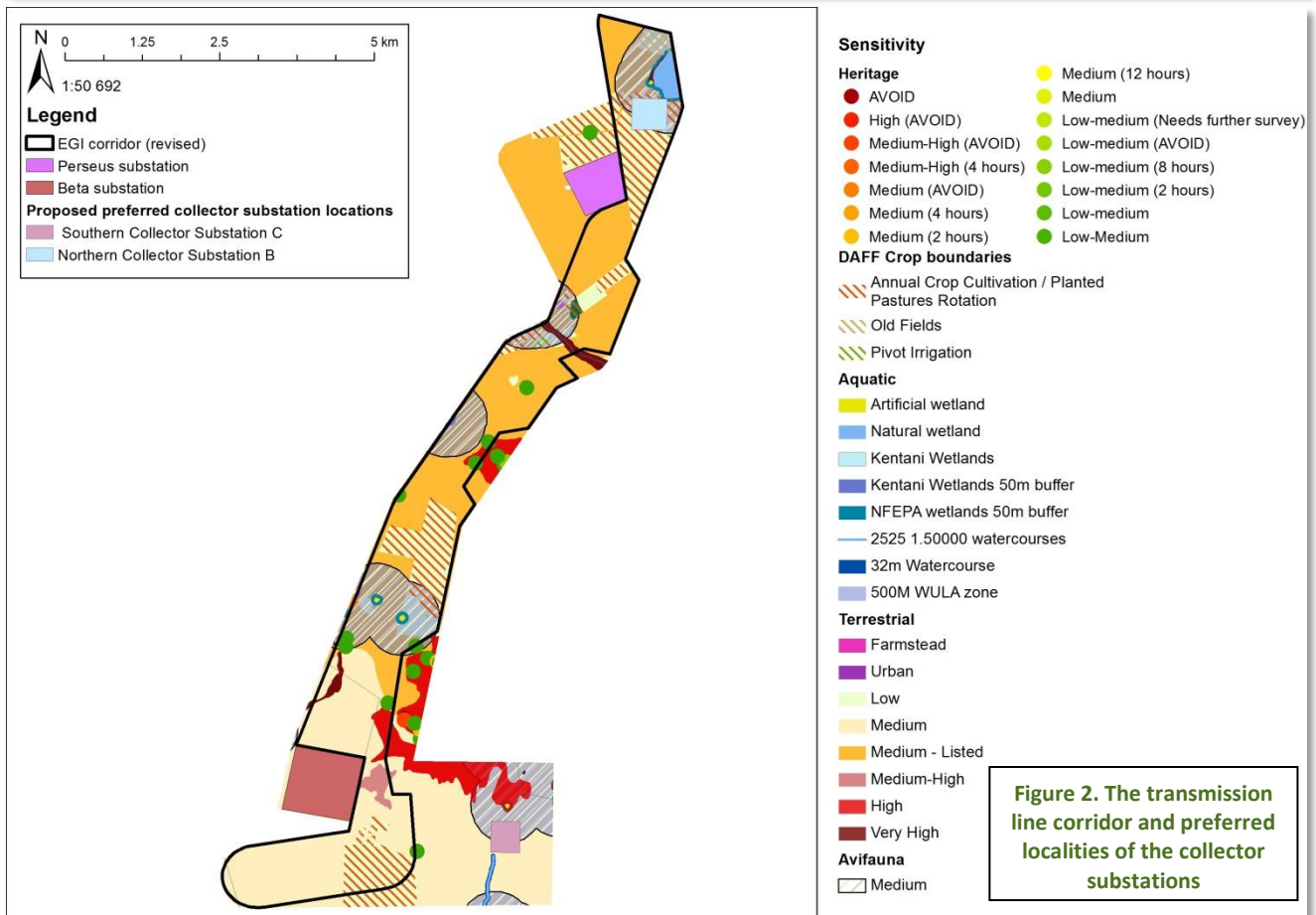
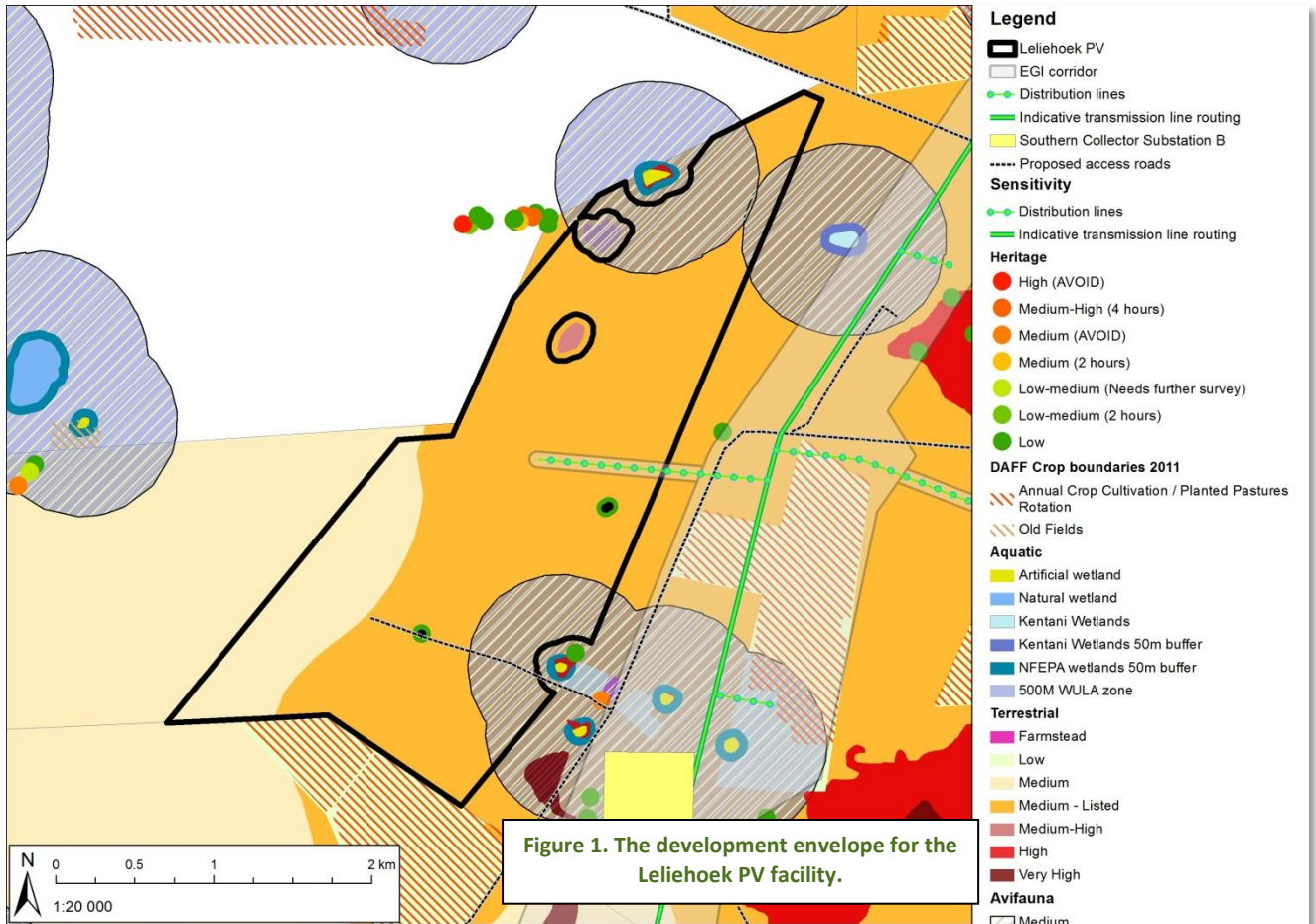
## Environmental Impact Assessment

Specialist studies were undertaken for the significant issues that were identified during the Scoping Phase of the project which concluded in March 2015. A summary of the specialist studies are included in Chapters 6 of this report and the full specialist studies are available on the project website: [www.csir.co.za/eia/kentanisolar](http://www.csir.co.za/eia/kentanisolar). A summary of the potential significant (medium or high impact significance) impacts determined are detailed below (Table 3).

Based on the findings of the specialist studies, an environmental sensitivity map was produced for the project (Figure 1). This map shows the sensitivities on the PV site and also the preferred layout, known as the Development Envelope (refer to Section 3.6 of Chapter 3). The Development Envelope avoids the highly sensitive environmental features that were present within the original buildable area (please refer to Chapter 6 of the Draft EIAR for a detailed discussion). The Development Envelope is 551 ha in extent.

The supporting electrical infrastructure forming part of the suite of Kentani Solar Developments include a 275 kV/400kV transmission line and two collector substations. The supporting electrical infrastructure will not only be constructed for one project but for all eleven projects (assuming all the projects are approved). The final transmission line corridor and preferred locations of the collector substations are shown in Figure 2.

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT



DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Table 3: Summary of the significant environmental impacts

Environmental feature assessed	Impact description	Significance of significant impact pre-mitigation	Significance of significant impact post-mitigation
Soils and agricultural potential	Loss of agricultural land use	Medium Negative	Medium Negative
Visual	Potential visual intrusion of activities associated with constructing a transmission line and collector substations on existing views of sensitive visual receptors	Medium Negative	Medium Negative
	Visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors during the operational phase	Medium Negative	Medium Negative
	Visual intrusion of transmission lines along the proposed corridor on existing views of sensitive visual receptors	Medium Negative	Medium Negative
	Visual intrusion of decommissioning activities on existing views of sensitive visual receptors	Medium Negative	Medium Negative
Socio-economic	Expenditure related impacts	Medium Positive	Medium to High Positive
	Socio-economic and enterprise development funding impacts	Medium Positive	Medium to High Positive
	Social impact associated with influx of people	Medium Negative	Low Negative
	Impact on surrounding land owners	Medium Negative	Low Negative
Aquatic ecology	Changes to water quality	Medium Negative	Low Negative
	Changes to the hydrological regime and increased potential for sedimentation and erosion	Medium Negative	Low Negative
Terrestrial ecology	Impacts on vegetation and protected plant species	Medium High Negative	Medium Negative
	Direct Faunal Impacts	Medium High Negative	Medium Negative

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Environmental feature assessed	Impact description	Significance of significant impact pre-mitigation	Significance of significant impact post-mitigation
	Soil Erosion Risk	Medium Negative	Low Negative
	Alien Plant Invasion Risk	Medium Negative	Low Negative
	Inadequate rehabilitation of the site	Medium High Negative	Low Negative
<b>Heritage</b>	Destructive impacts to palaeontological resources	High Negative	Low Negative
<b>Avifauna</b>	Collision of birds with overhead power lines	Medium Negative	Low Negative
	Electrocution of birds on power line towers	High Negative	Low Negative
	Disturbance of birds and barrier effects	Medium Negative	Medium Negative
	Collision of birds with panels and other infrastructure	Medium Negative	Low Negative
	Habitat destruction associated with the construction of the facility	Medium Negative	Medium Negative

## Overall evaluation by the Environmental Assessment Practitioner

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The potential impacts that may occur during the different phases of the proposed development of the Leliehoek PV project has been assessed and the summarised findings discussed in this chapter. Based on the findings of the specialist studies, the proposed project is considered to have an **overall low negative** environmental impact and an overall **medium positive** socio-economic impact.

The locality of the proposed Leliehoek PV project falls within an area that contains electrical infrastructure that includes the Beta and Perseus substations and existing transmission lines. It is therefore evident that the views from the various visual receptors and landscape have already been altered by the addition of the electrical infrastructure into the area. The locality of this project would therefore not have a significant (high) impact on any sensitive viewers (as determined during the Visual Impact Assessment) and the viewers affected are most probably the land owners that granted consent to construct the facility on their farm. No environmental features will be significantly (high) negatively impacted on, although the direct faunal impacts and impacts to the vegetation and protected plant species will be of medium negative impact significance, following the implementation of the proposed mitigation measures. The development will have a low negative impact on the current agricultural land use of the site.

Based on the findings of the EIA for the proposed Leliehoek PV project it is the reasoned opinion of the EAP for this EIA process, Ms Surina Laurie, that the Leliehoek PV project (and associated distribution lines) proposed to be developed on the remainder of farm Leliehoek No. 748 and the remainder of farm Constantia, No. 751 should receive Environmental Authorisation in terms of the EIA Regulations.

## Environmental Assessment Process

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As part of the EIA process all Registered Interested and Affected Parties are invited to comment on this Draft EIAR. An electronic version of this report is available on the project website at: [www.csir.co.za/eia/kentanisolar](http://www.csir.co.za/eia/kentanisolar). This report is available for commenting for a 40-day period from the date of release. All comments should be submitted to the CSIR and addressed to the contact person below.

### **CSIR (Environmental Management Services)**

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