

Environmental Impact Assessment for the
proposed Irene 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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REPORT DETAILS

| | |
|-----------------------------|--|
| Title: | Environmental Impact Assessment Report for the proposed Irene PV solar energy project and supporting electrical infrastructure near Dealesville in the Free State |
| Prepared for: | South Africa Mainstream Renewable Power Developments (Pty) Ltd <i>Physical Address:</i> 4th Floor Mariendahl House, Newlands on Main, Cnr main road and Campground, Claremont 7708, Cape Town <i>Postal Address:</i> P.O. Box 45063, Claremont 7753 <i>Contact person:</i> Enelge Gildenhuys, email: Enelge.Gildenhuys@mainstreamrp.com |
| Prepared by: | Council for Scientific and Industrial Research (CSIR) PO Box 320 Stellenbosch 7599 |
| Lead Authors: | Surina Laurie, email: slaurie@csir.co.za , tel: (021) 888 2490 Paul Lochner, email plochner@csir.co.za |
| CSIR Report Number: | CSIR/CAS/EMS/ER/2014/0011/B |
| CSIR Project Number: | EMS0088 |
| DEA Ref Number: | 14/12/16/3/3/2/718 |
| Date: | July 2015 |
| To be cited as: | CSIR, 2015. Environmental Impact Assessment Report for the proposed Irene 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 | F00400000000118300000 F00400000000146300000 F00400000000019800000 F00400000000014900000 F00400000000103000000 F00400000000103100001 F00400000000103100000 F00400000000095300000 F00400000000030500000 F00400000000014800000 F00400000000054600000 F00400000000074800000 F00400000000074900000 F00400000000014900000 |
| 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: 1. Type of technology 2. Structure height 3. Surface area to be covered (including associated infrastructure such as roads) 4. Structure orientation 5. Laydown area dimensions (construction period and thereafter) 6. Generation capacity | 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: • Current use of land on site | Included on CD and discussed in Chapter 5 and 6 of this report |

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| | |
|---|---|
| <ul style="list-style-type: none"> • Rivers, streams and watercourses • Ridgelines and 20 m continuous contours with height references in the GIS database • Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs • High potential agricultural areas as defined by DAFF • Buffer zones • Indicated isolated residential, tourism facilities on or within 1 km of the site | |
| 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"> • Positions of the solar facilities • Foundation footprint • Permanent laydown area footprint • Construction period laydown footprint • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve • River, steam and water crossing of roads and cables indicating the type of bridging structures that will be used • Substations and/or transformers sites including their entire footprint • Cable routes and trench dimensions • Connection routes to the distribution/transmission network • Cut and fill areas along roads and at substations/transformer sites indicating the expected volume of each cut and fill • Borrow pits • Spoil heaps • Building including accommodation | Figure 6.24 and Figure 8.3 and A3 map included in Appendix B.2 |
| Regional map and GIS information | Reference in the report |
| 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 |

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| | |
|--|--|
| CBAAs 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 (<i>this project</i>) | 14/12/16/3/3/2/718 | 100 | ~400 |
| Leliehoek PV | 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 Irene PV project. It is proposed that the Irene 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 13 km south west of Dealesville and is accessed by an untarred road. The center point coordinates for this project site is 28°45'53.09"S; 25°40'49.44"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

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 |
|---|--|---------------------------------|
| Environmental Assessment Practitioners | | |
| Paul Lochner | CSIR | Project leader (EAPSA) |
| Surina Laurie | CSIR | Project manager |
| Specialists | | |
| 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 |

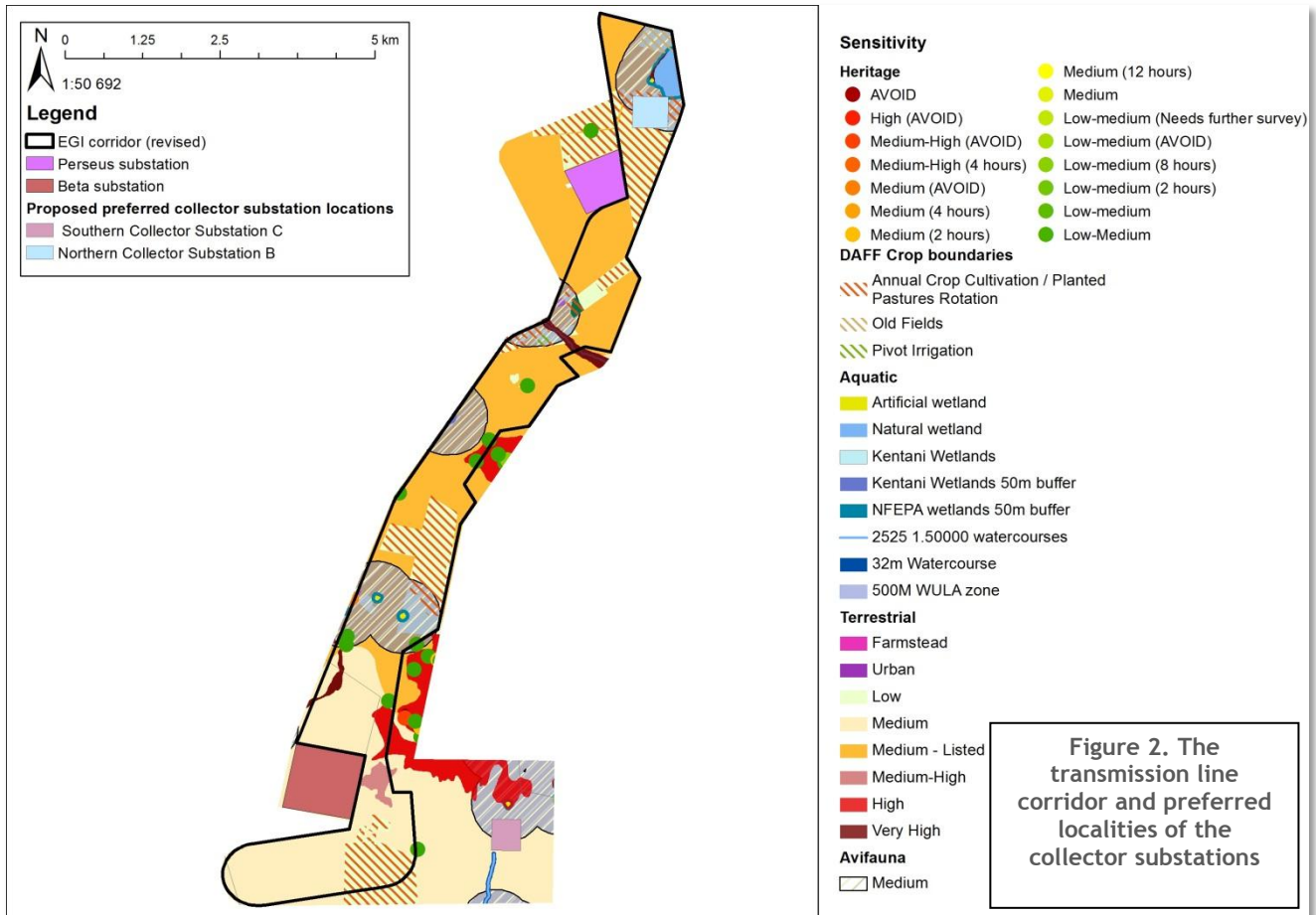
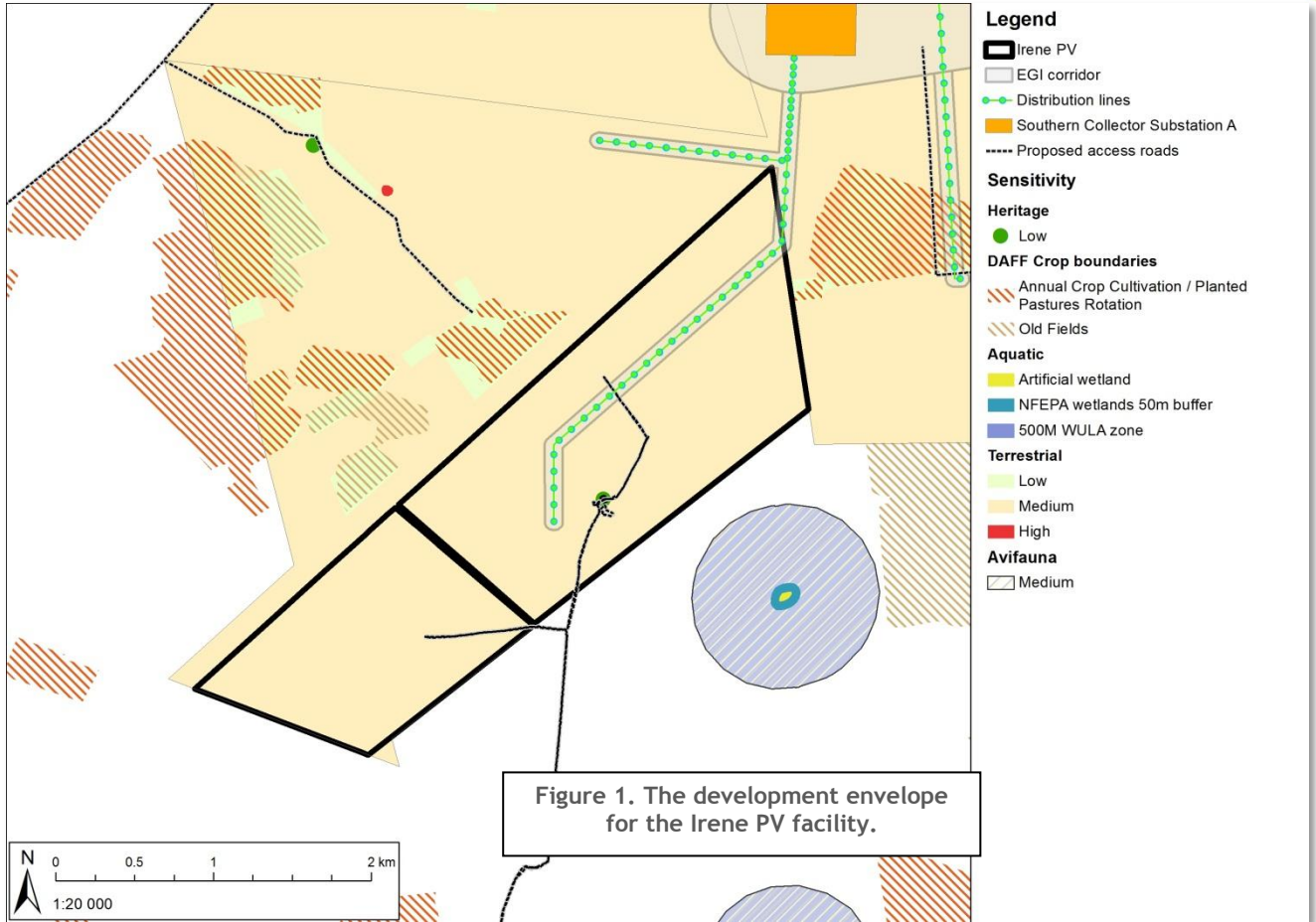
Environmental Impact Assessment

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. 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 434 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.

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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 |
| Terrestrial ecology | Impacts on vegetation and protected plant species | Medium High Negative | Medium Negative |
| | Direct Faunal Impacts | Medium High Negative | Medium Negative |
| | 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 |

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| Environmental feature assessed | Impact description | Significance of significant impact pre-mitigation | Significance of significant impact post-mitigation |
|--------------------------------|--|---|--|
| Heritage | Destructive impacts to palaeontological resources | High Negative | Low Negative |
| Avifauna | 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

The potential impacts that may occur during the different phases of the proposed development of the Irene 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 Irene 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 Irene PV project it is the reasoned opinion of the EAP for this EIA process, Ms Surina Laurie, that the Irene PV project proposed to be developed on the farms Irene, No. 1183 and Klein Begin No. 1463 and the associated distribution line on the farms Braambosch, No. 198 and the remainder of the Farm Braklaagte Number 149, should receive Environmental Authorisation in terms of the EIA Regulations.

Environmental Assessment Process

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. 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)

Contact Person: Surina Laurie
PO Box 320
Stellenbosch
7599
Tel: 021 888 2490
Fax: 021 888 2693
Email: slaurie@csir.co.za